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**TRAFFIC QUALITY ON THE ATLANTA
REGIONAL HIGHWAY SYSTEM**

(FALL 1998)

FINAL REPORT

*Prepared by
Skycomp Inc, Columbia, Maryland
for the Georgia Department of Transportation*

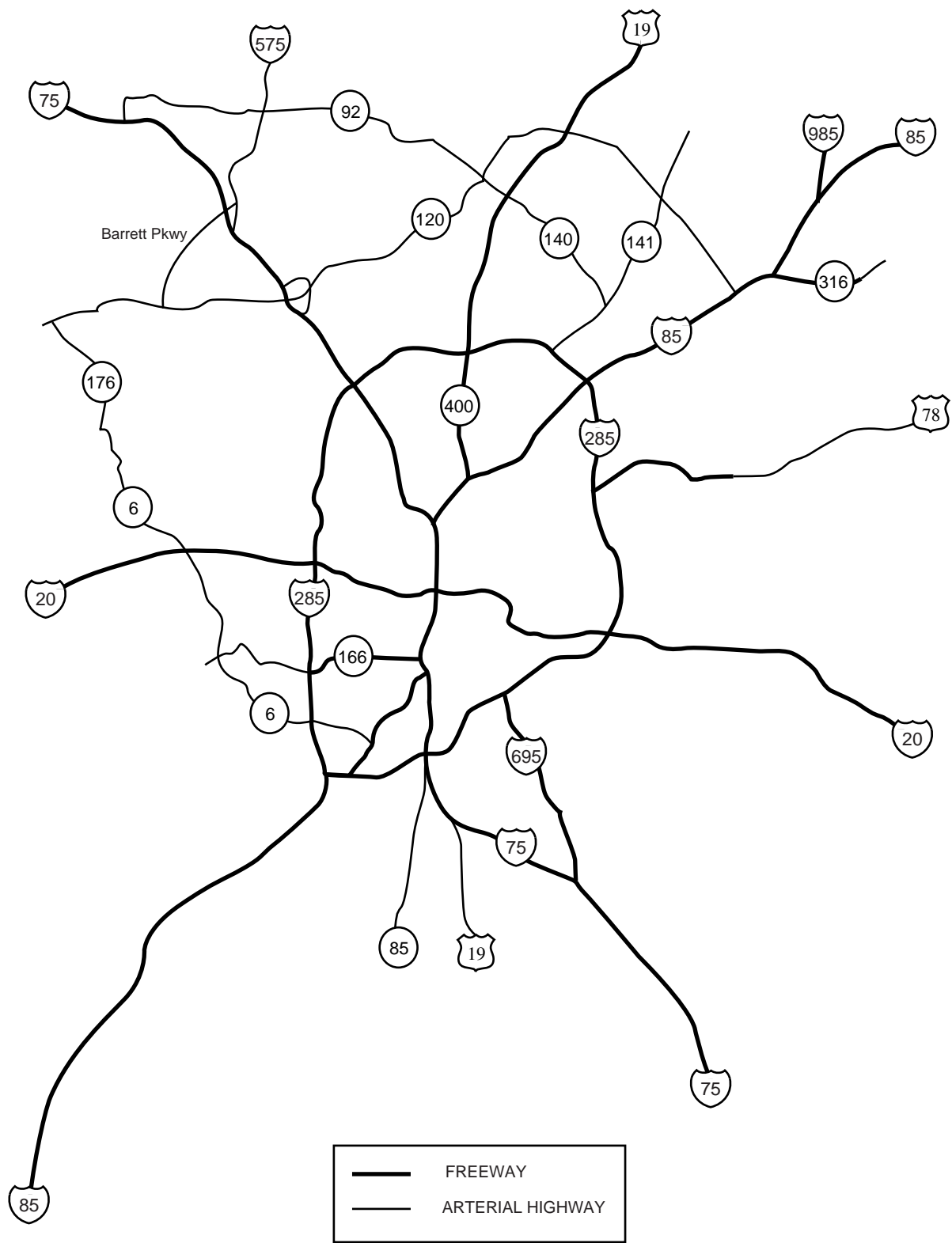
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SURVEYED HIGHWAYS



INTRODUCTION

In the fall of 1998, Skycomp conducted a series of aerial photo-surveys of highway traffic quality in the metropolitan Atlanta planning region. The purpose was to obtain traffic quality information to support regional planning activities. Using the mobility and vantage point of fixed-wing aircraft, a photographic inventory of traffic quality was made on the backbone of the transportation system: approximately 500 miles of highways were surveyed during the peak morning and evening periods of commuter travel. One of the products of this survey program is a database of traffic quality on each link of the highway system, representing average conditions as of autumn 1998. This database comprises a base line for future comparisons, so that long-term trends can be monitored and the effects of changes on the system can be evaluated.

FEATURES OF THE AERIAL SURVEY PROGRAM

During this aerial survey program, 100% overlapping photographic coverage was obtained of approximately 500 miles of designated highways, normally repeated once an hour over four weekday mornings and evenings; the morning times of coverage were 6:30 to 9:30 a.m., and evening times were 4:00 to 7:00 p.m. Primary survey flights were conducted only on weekdays, except that Monday mornings, Friday evenings and mornings after holidays were excluded. Traffic quality information was extracted from the aerial photographs such that, by highway link and by time slice, average recurring daily traffic quality could be measured. This report presents these measurements in the following ways:

1. Performance ratings of traffic quality on the 500 miles of surveyed highways are presented in Parts One and Two of this report. The ratings (less the effect of incidents) are presented in tables by highway segment, by direction and by time slice. In the tables, ratings representing one-hour time slices typically reflect the average of four observations (from four different days), minus any data affected by incidents. On freeways (uninterrupted-flow facilities), ratings are density-based levels-of-service, as defined in the *1997 Update to the Highway Capacity Manual (HCM)*. For level-of-service "F" (congested flow), corresponding average densities are also provided, which give greater insight into the severity of each congested zone. On the arterial highway system (interrupted-flow facilities), a surrogate level-of-service rating system has been used, based on queue populations and platoon characteristics. This rating system is not travel-time based, but is generally consistent with the qualitative characteristics of each service level contained on page 11-4 of the HCM (see appendices A and B for detailed methodologies).
2. Maps containing narratives have been placed opposite each performance rating table; these narratives clarify the severity and frequency of all congestion found along each highway segment; where evident, apparent causes of the problems are also described. Congested intersections on side-streets and congested freeway ramps are also depicted and discussed.
3. An archive of highlight photography which illustrates congestion found on each highway has been delivered separately on a **fully interactive CD-ROM slide show (*Congestion Highlights*)**. This disk, which plays on desktop Pentium computers equipped with the "Windows" operating system (WIN 95/98/NT), allows point-and-click access to any performance rating table or selected highlight photographs for public presentation or desktop review.

One set of overlapping aerial photographs of each surveyed highway has been compiled into a **second interactive CD-ROM slide show (*North Photolog and South Photolog*)**, to serve as a reference tool in the planning process. Thus, using a desktop computer, an aerial photograph of any location on the surveyed highway system can be quickly located with a few clicks of the mouse. Once located, photographs can be copied and used for computer slide shows, emailing, or written reports.

4. Tables showing all data which underlie the (averaged) performance ratings are provided in the appendices. Incident-affected data which were excluded from averaging are also provided and tagged. For freeways, densities (in units of 10's) are provided in these tables, listed by flight number, segment and time-slice.

5. All averaged Skycomp LOS and surrogate LOS ratings have been collected into one spreadsheet database file. In order for GDOT computers to access the data, a look-up table has been prepared which lists Skycomp segment identifiers for each GDOT segment identifier. For freeways only, projections were made of flow rates, travel times and delays based on a speed/density relationship. Over 150 speed/density samples were generated on the freeways in Atlanta to confirm that the speed/density table developed in Washington D.C. (Appendix F) could be applied to travel in the Atlanta metropolitan area (these data are provided in Appendix G).

METHODOLOGY

Techniques to determine highway traffic quality from the aerial photographs are outlined in the appendices. A brief description of traffic quality associated with each level-of-service / traffic quality rating is also provided on pages 4-7.

ACKNOWLEDGMENTS AND QUESTIONS

In order to predict average travel speeds from aerial densities, staff from the Metropolitan Washington (D.C.) Council of Governments calibrated a single-regime model developed by Michael Van Aerde for use in the metropolitan Washington area. The model was submitted by Van Aerde to the Transportation Research Board in 1995 (TRB Paper No. 95082; see also discussion in Appendix A).

If there are any questions about this survey program or the underlying methodology, please direct them to Gregory Jordan at 410-884-6900.

FREEWAY LEVEL-OF-SERVICE RATINGS (UNINTERRUPTED-FLOW FACILITIES):

(NOTE: LEVEL-OF-SERVICE RATINGS ARE BASED ON AVERAGE DENSITIES BETWEEN INTERCHANGES, WHICH ARE GENERALLY GREATER THAN ONE MILE APART. THE EFFECTS OF INCIDENTS AND TEMPORARY ROADWORK HAVE BEEN REMOVED FROM ALL RATINGS BEFORE AVERAGING.)

Level-of-service A: Light traffic flow, at free-flow speeds.

Level-of-service B: Light-to-moderate traffic flow, at free-flow speeds.

Level-of-service C: Moderate traffic flow, usually at free-flow speeds; freedom to maneuver somewhat restricted.

Level-of-service D: Moderate to heavy traffic flow; speeds can be slightly below free-flow; freedom to maneuver significantly restricted.

Level-of-service E: Heavy traffic flow, at speeds typically between 60 and 40 mph. Little or no capacity to absorb additional traffic.

Level-of-service F: Congested traffic flow, with speeds that can range from below 5 mph up to approximately 50 mph. For this reason, all "F" ratings have been augmented with average density values, which provide greater insight into the nature of the traffic flow (units are passenger cars per lane-mile):

Densities from 45 to 60: "level-of-service "F" traffic flow averaging approximately 50-30 mph;

Densities from 60 to 80: "slow-then-go" traffic flow (some stopping can occur); traffic flow averaging approximately 30-20 mph;

Densities from 80 to 100: typically associated with "stop-and-go" traffic flow; average travel speeds approximately 20-10 mph. This is the upper boundary that daily congestion is normally measured at.

(Densities above 100 for the full length of a segment usually indicate the presence of an incident or construction.)

Densities from 100 to 120: Average travel speeds typically less than 10 mph. In rare cases, daily congestion can be measured at this level, especially for short bottleneck segments.

Densities from 120 to 180: severe congestion associated with incidents or construction (180 is the highest density measured by Skycomp, with a corresponding average travel speed below 5 mph).

(For more information, refer to "Procedures for determining freeway level-of-service" in the Appendix A. These service level definitions are based on the 1997 (Updated) Highway Capacity Manual.)

ARTERIAL HIGHWAY TRAFFIC QUALITY RATINGS (INTERRUPTED-FLOW FACILITIES)*:

(NOTE: THESE DESCRIPTIONS APPLY TO TRAVEL ALONG HIGHWAY SEGMENTS, WHICH ARE GENERALLY 1 TO 3 MILES IN LENGTH; CONGESTED INTERSECTIONS WITHIN EACH SEGMENT ARE REPORTED SEPARATELY. THE EFFECTS OF INCIDENTS AND TEMPORARY ROADWORK HAVE BEEN REMOVED FROM ALL RATINGS BEFORE AVERAGING.)

Arterial quality level A: Very light traffic flow; few cars using the roadway.

Arterial quality level B: Light traffic flow; little or no platooning.

Arterial quality level C: Moderate traffic flow; platoon populations under 15 vehicles per lane.

Arterial quality level D: Heavy traffic flow; queuing at signals, but all should clear on green (less than 20 vehicles per lane); platoon populations between 15 and 25 vehicles per lane.

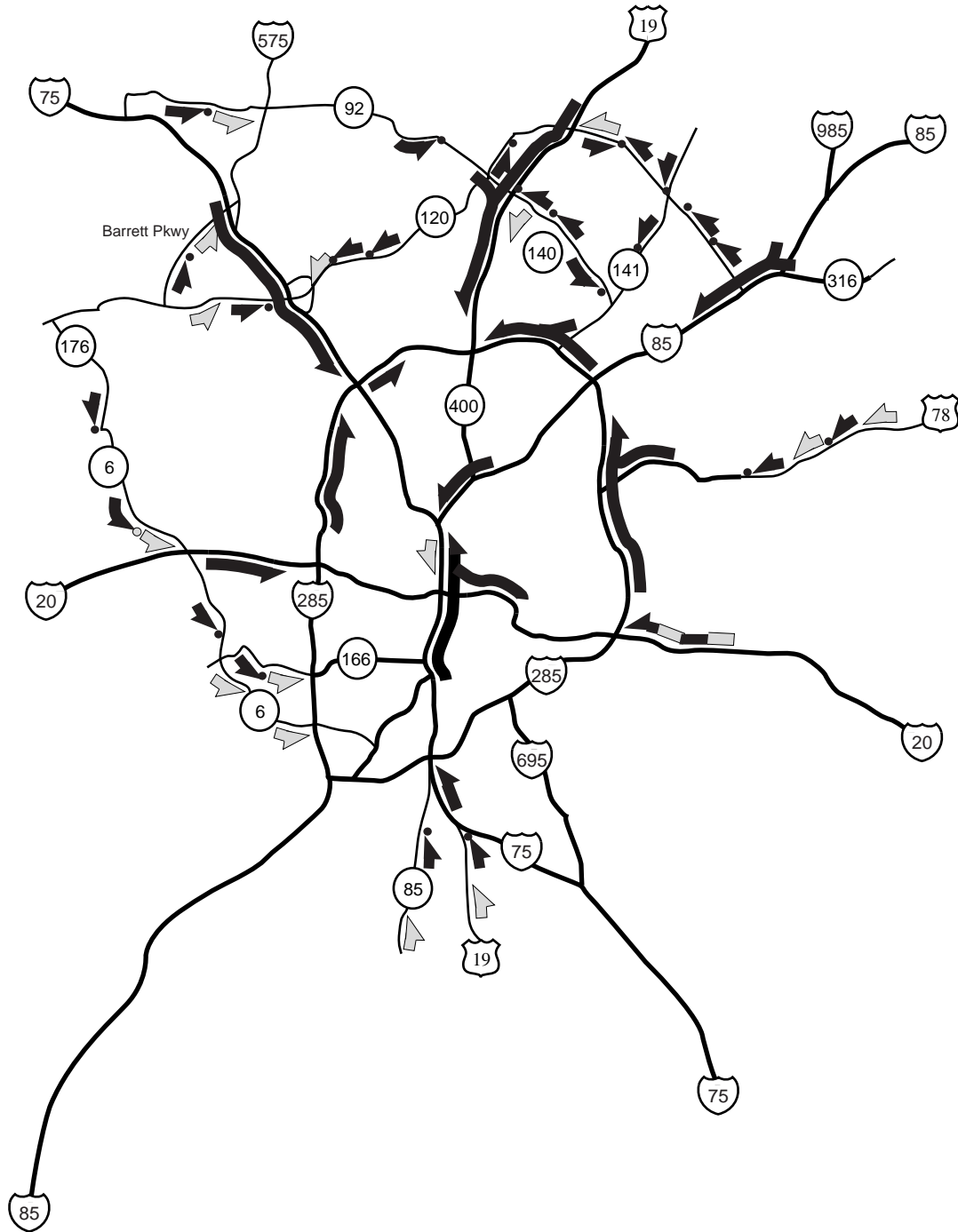
Arterial quality level E: Congested traffic flow; large queues (20-40 vehicles per lane) at one or two intersections; slow-moving platoons of greater than 25 vehicles per lane (if one lane, resembles a funeral procession). Also may designate intermittent "F" congestion.

Arterial quality level F: Severely congested traffic flow, usually exhibiting either: 1) traffic backing through upstream signal(s); 2) a series of intersections with large queues (20-40 vehicles per lane); or 3) greater than 40 vehicles per lane queued at one intersection.




* (While these are not arterial level-of-service ratings, they are consistent with the qualitative descriptions of each service level as described on page 11-4 of the 1997 updated Highway Capacity Manual. They do not represent travel time measurements, however, which are the basis for calculating arterial service level ratings.)

(For more information, refer to "Procedures for determining arterial highway traffic quality" in the Appendix B.)



LOCATIONS WHERE CONGESTION WAS FOUND IN THE ATLANTA METROPOLITAN AREA MORNING (FALL 1998)



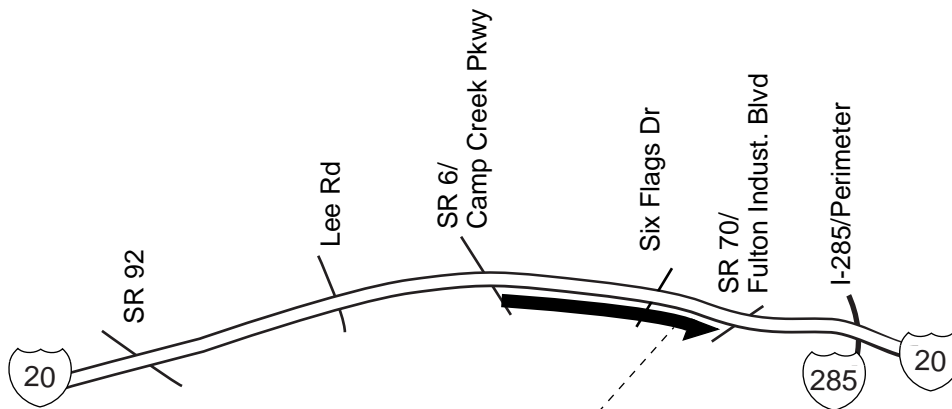
SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

FREEWAY TRAFFIC QUALITY



-  Heavy traffic flow or intermittent congestion
-  Congested traffic flow

I-20 (WEST OF PERIMETER) MORNING (FALL 1998)

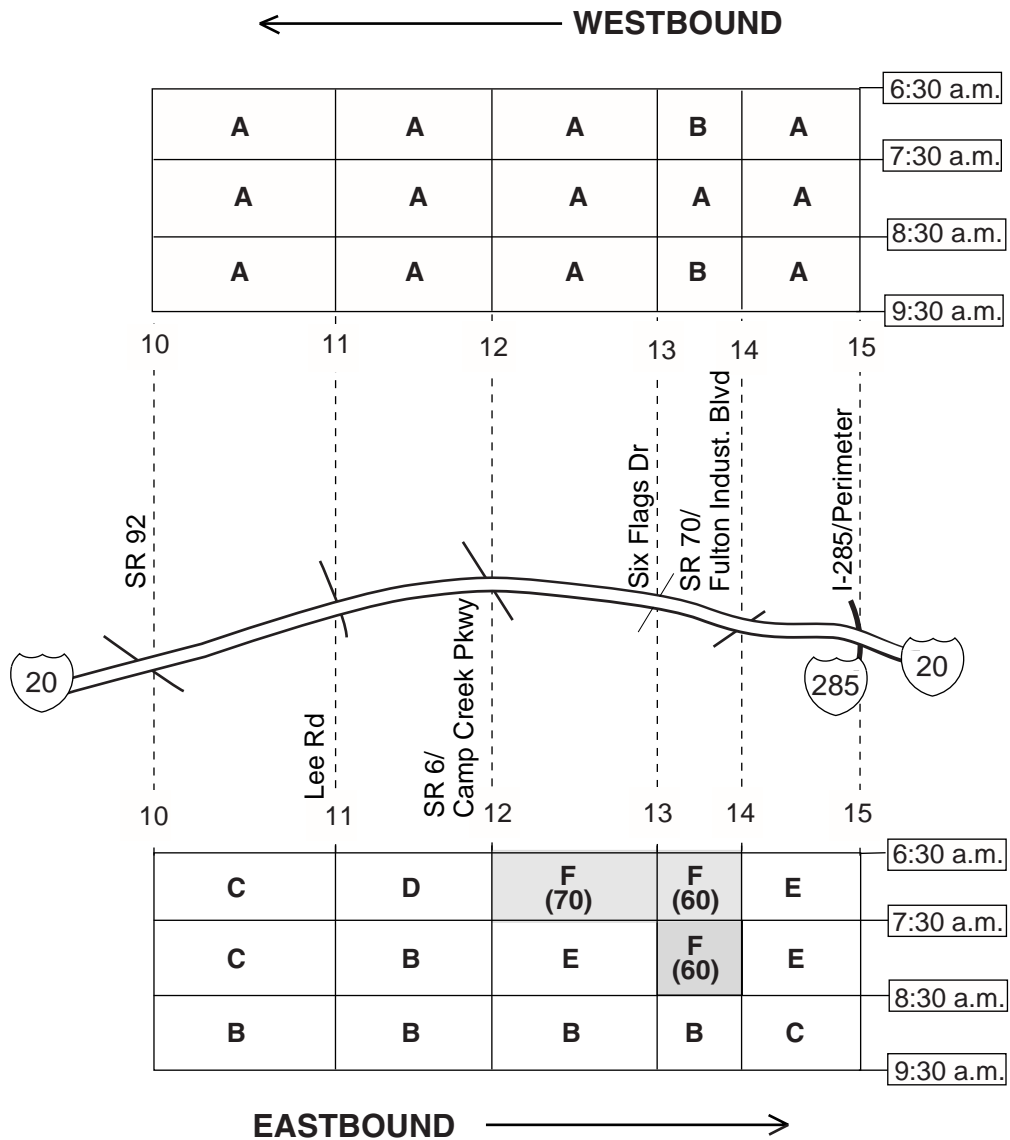


During most observations before 8:00 a.m., moderate to severe eastbound congestion was found on I-20 between Camp Creek Pkwy and Fulton Industrial Blvd. This congestion was exacerbated by two separate lane drops (4 lanes to 3) located between these interchanges; east of Fulton Ind. Blvd, traffic flow typically improved.

FREEWAY TRAFFIC QUALITY

-  Heavy traffic flow or intermittent congestion
-  Congested traffic flow

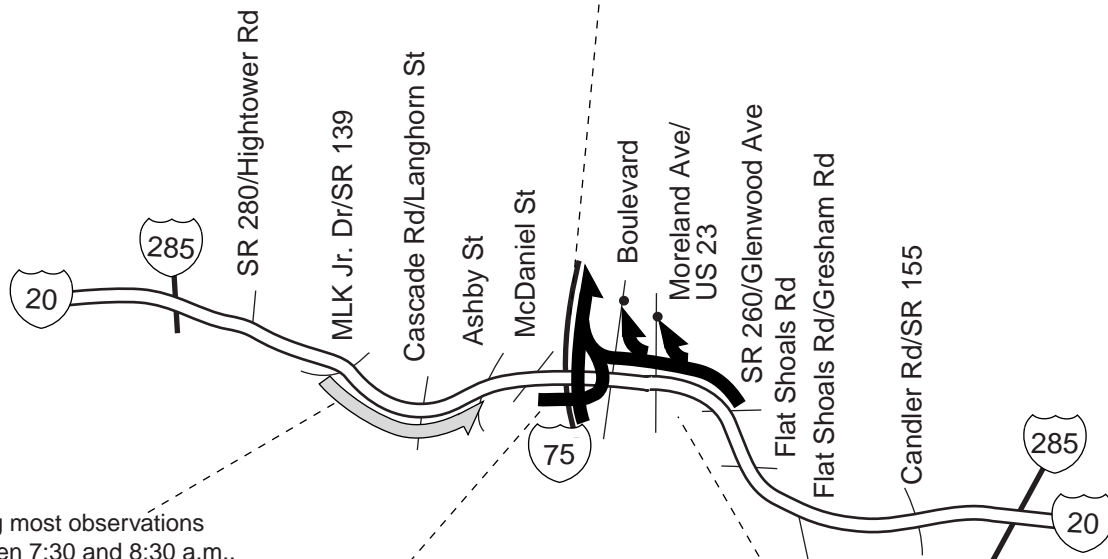
I-20 (WEST OF PERIMETER) MORNING (FALL 1998)



I-20 (INSIDE PERIMETER) MORNING (FALL 1998)



During most observations, moderate to severe westbound congestion was found on I-20 between the vicinity of Flat Shoals Rd and I-75; estimated average speeds within this congested zone ranged from approximately 20-40 mph. The head of the queue was located at the closely spaced ramps at Capitol Ave and I-75; exit queues on these ramps intermittently extended back into the mainline of I-20. The lane drop (4 lanes to 3) at Capitol Ave also contributed to the congestion. West of I-75, traffic typically resumed free flow speeds.





During most observations between 7:30 and 8:30 a.m., eastbound congestion was found on I-20 between the vicinity of MLK Jr. Dr. and Ashby St; estimated average speeds typically ranged from approximately 35-50 mph. No apparent cause was found for this congestion; however, roadway geometrics (curves) and low sun angle (glare) may have contributed to the slowing.

During most morning observations, the eastbound exit ramp to northbound I-75 was congested; significant delays were typically encountered by travelers using this ramp. Three bottlenecks contributed to this congestion: 1) lane drop on the ramp 2) merge with traffic from the westbound I-20 ramp 3) merge into congested flow on northbound I-75. Although this ramp queue was extensive, thru-traffic on eastbound I-20 was not affected.

During most observations, the westbound exit ramps at Boulevard and Moreland Ave were congested; the head of these queues were at the signalized intersections at Memorial Dr. In some cases, eastbound I-20 traffic exiting at Moreland Ave was also congested.

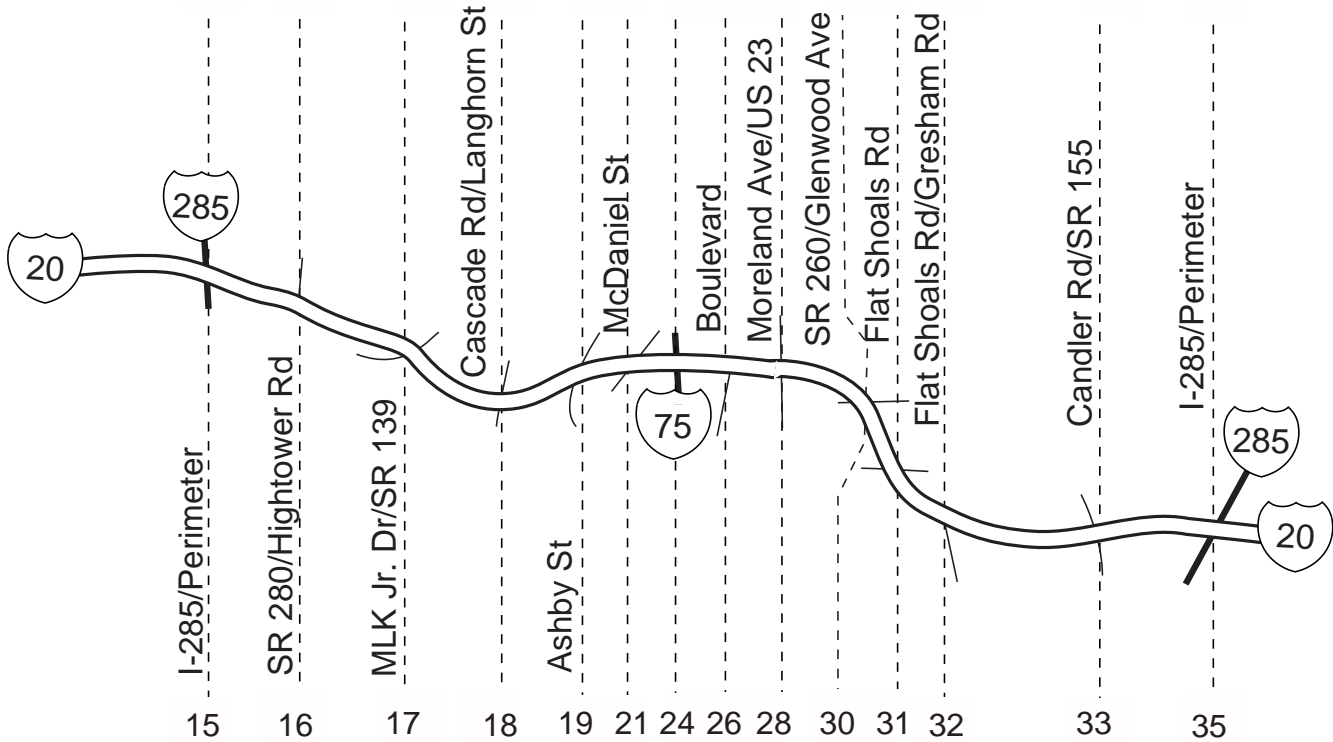
FREEWAY TRAFFIC QUALITY

-  Heavy traffic flow or intermittent congestion
-  Congested traffic flow

I-20 (INSIDE PERIMETER) MORNING (FALL 1998)

← WESTBOUND

C	B	B	B	B	C	F (70)	F (55)	F (45)	F (45)	E	D	D	6:30 a.m.
B	B	A	B	B	B	F (75)	F (60)	F (55)	F (45)	D	D	D	7:30 a.m.
A	A	A	B	B	B	E	F (45)	E	C	B	C	B	8:30 a.m.
													9:30 a.m.
15	16	17	18	19	21	24	26	28	30	31	32	33	35

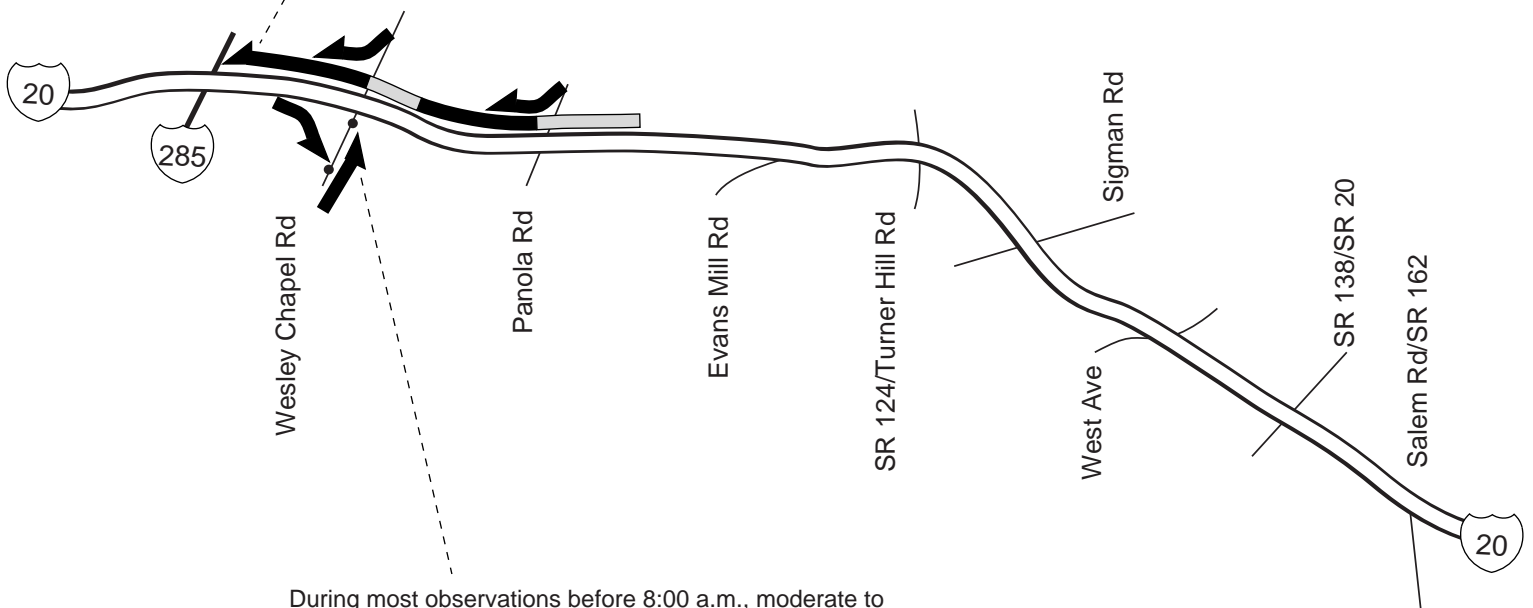


C	C	C	D	C	B	B	B	A	A	A	A	A	6:30 a.m.
D	E	F (50)	F (45)	C	B	B	B	A	A	A	A	A	7:30 a.m.
B	C	D	D	B	B	B	B	A	A	A	A	A	8:30 a.m.
													9:30 a.m.

EASTBOUND →



I-20 (EAST OF PERIMETER)
MORNING (FALL 1998)

During most observations before 8:00 a.m., westbound congestion was found on I-20 between the vicinity of Panola Rd and the Perimeter; traffic entering at Panola Rd and Wesley Chapel Rd interchanges appeared to contribute to this congestion. Estimated average speed typically ranged from approximately 30-50 mph; some stop-and-go conditions were found within this queue. (See photos 23 - 27.JPG)



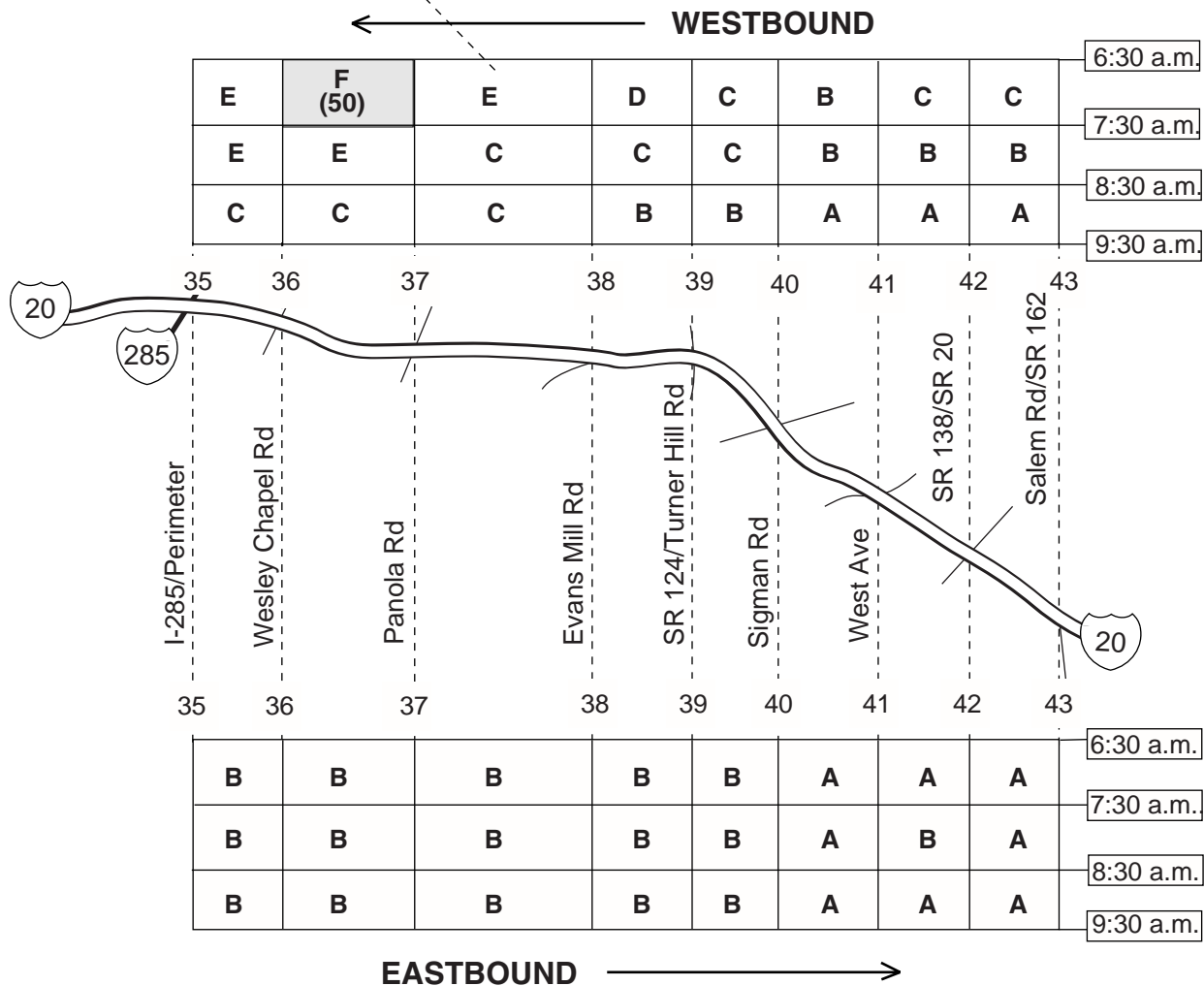
During most observations before 8:00 a.m., moderate to severe northbound congestion was found on Wesley Chapel Rd approaching the signalized intersection at I-20; in some cases, this queue backed through the upstream signal at Rainbow Dr. Intermittently, the eastbound exit ramp at Wesley Chapel Rd was congested; vehicles were queued at the signal at the head of the ramp. (See photo 28.JPG)

FREEWAY TRAFFIC QUALITY

-  Heavy traffic flow or intermittent congestion
-  Congested traffic flow

This level-of-service rating "E" represents the mathematical average of densities for the entire length of the segment from Evans Mill to Panola Rd. However, westbound congestion was typically found approaching the Evans Mill Rd interchange; the extent and severity of this congestion varied.

I-20 (EAST OF PERIMETER) MORNING (FALL 1998)

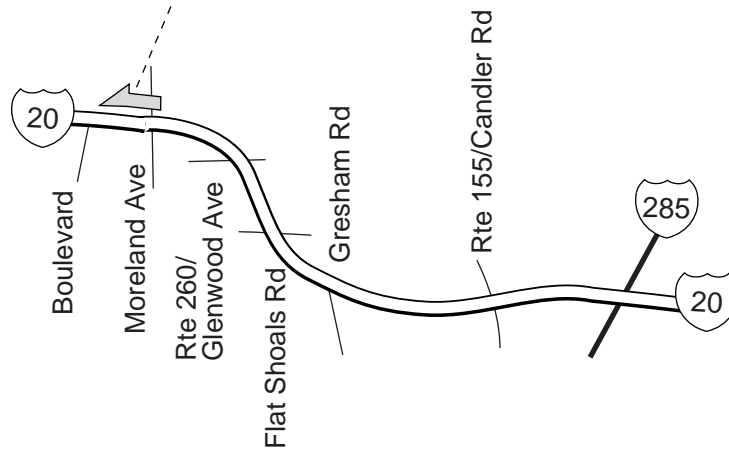




I-20 (HOV)

MORNING (FALL 1998)

Intermittently, westbound congestion was found in the HOV lane approaching its terminus in the vicinity of the Boulevard interchange. Although some slowing was found, delays in general did not appear significant.

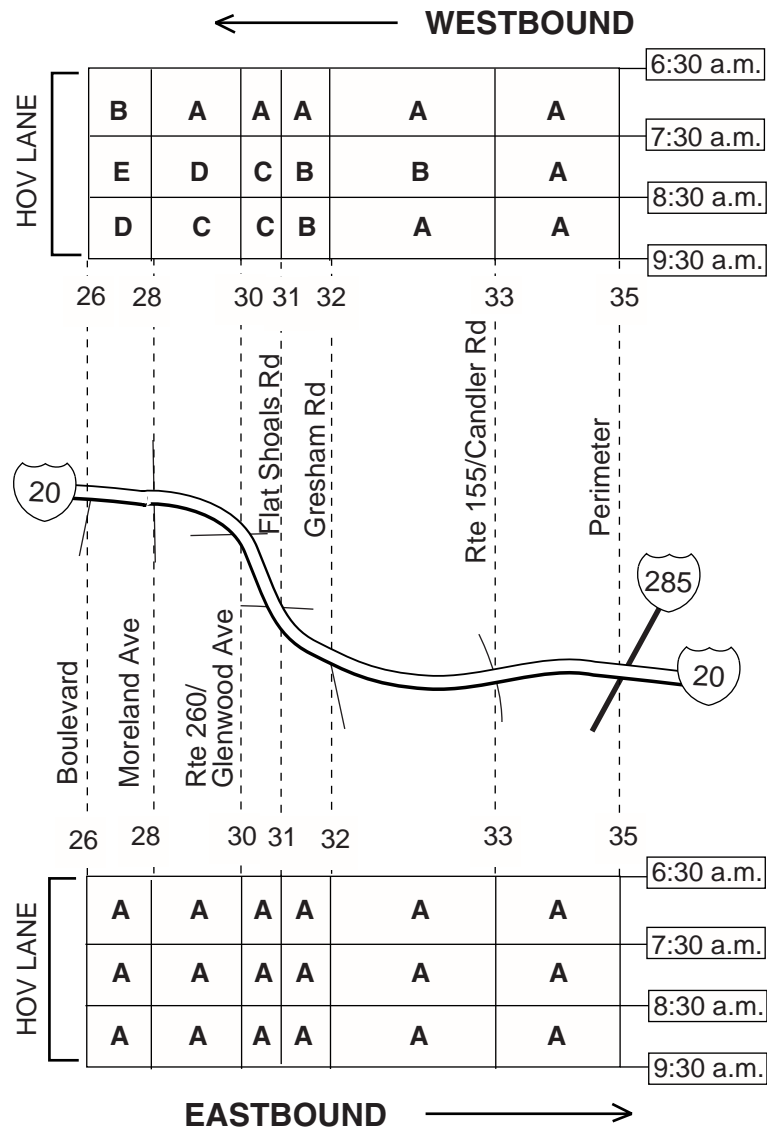


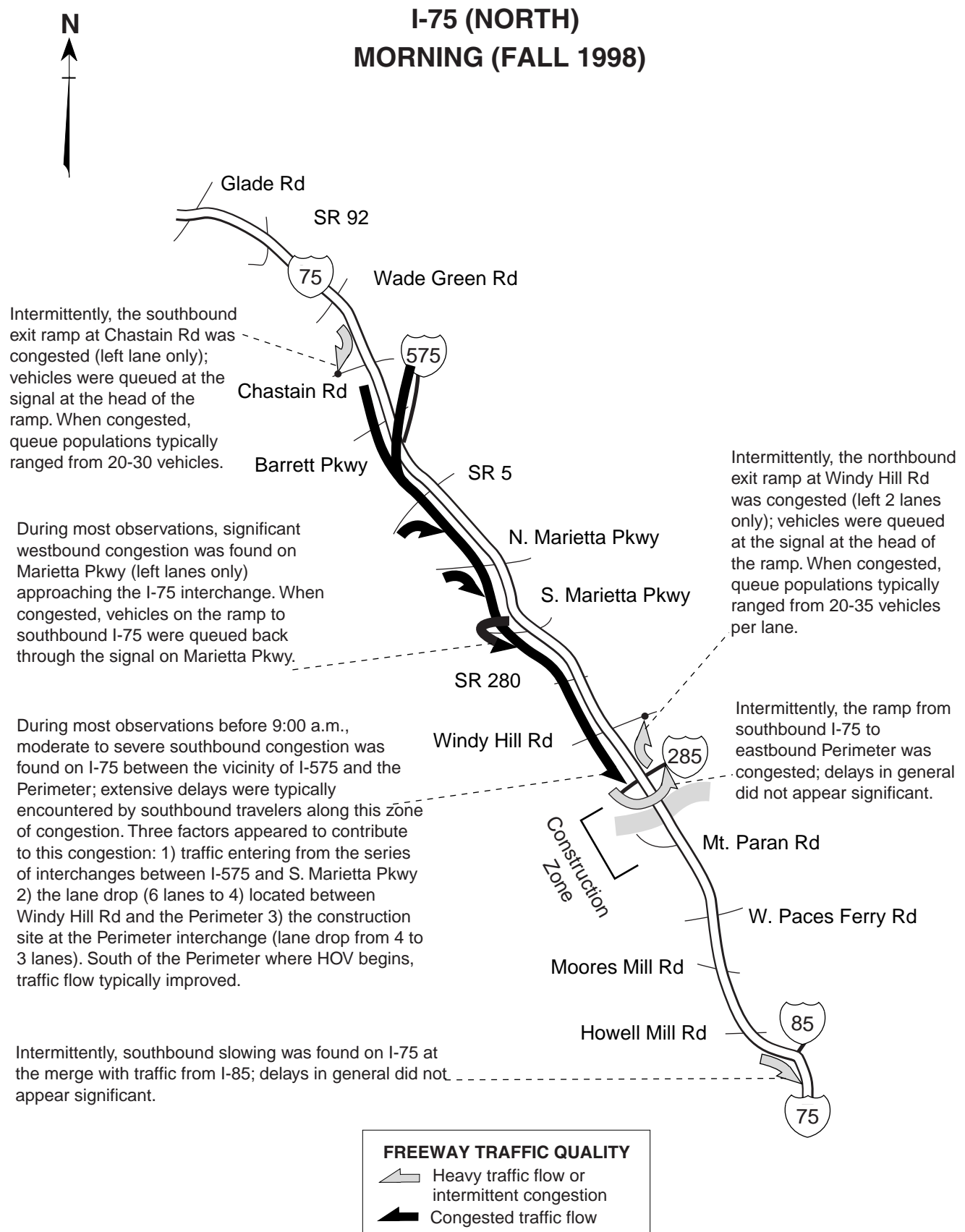
FREEWAY TRAFFIC QUALITY

- Heavy traffic flow or intermittent congestion
- Congested traffic flow

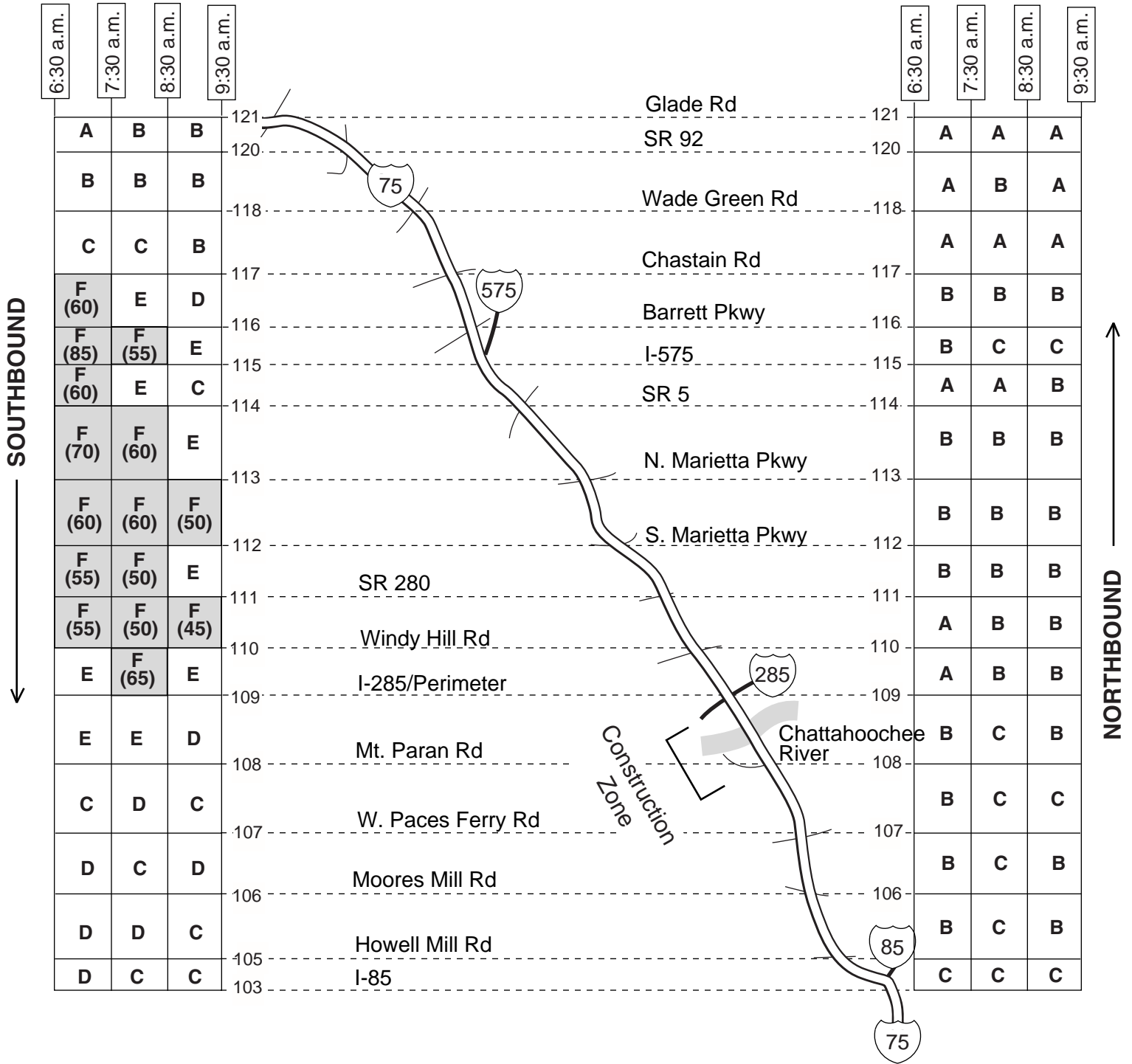
I-20 (HOV)

MORNING (FALL 1998)

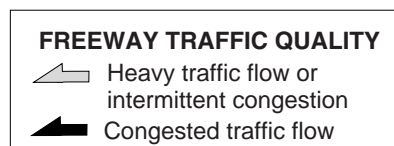
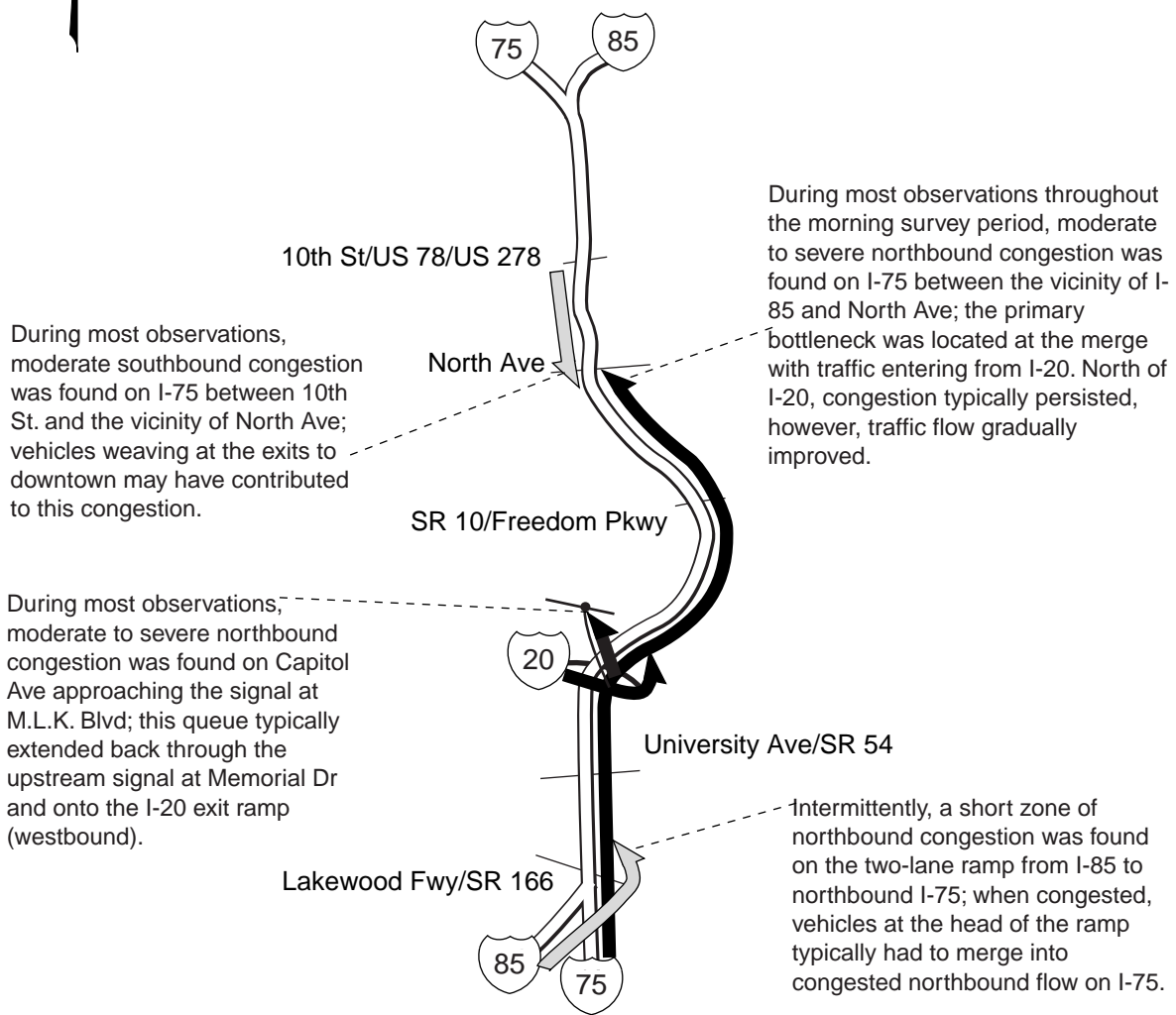




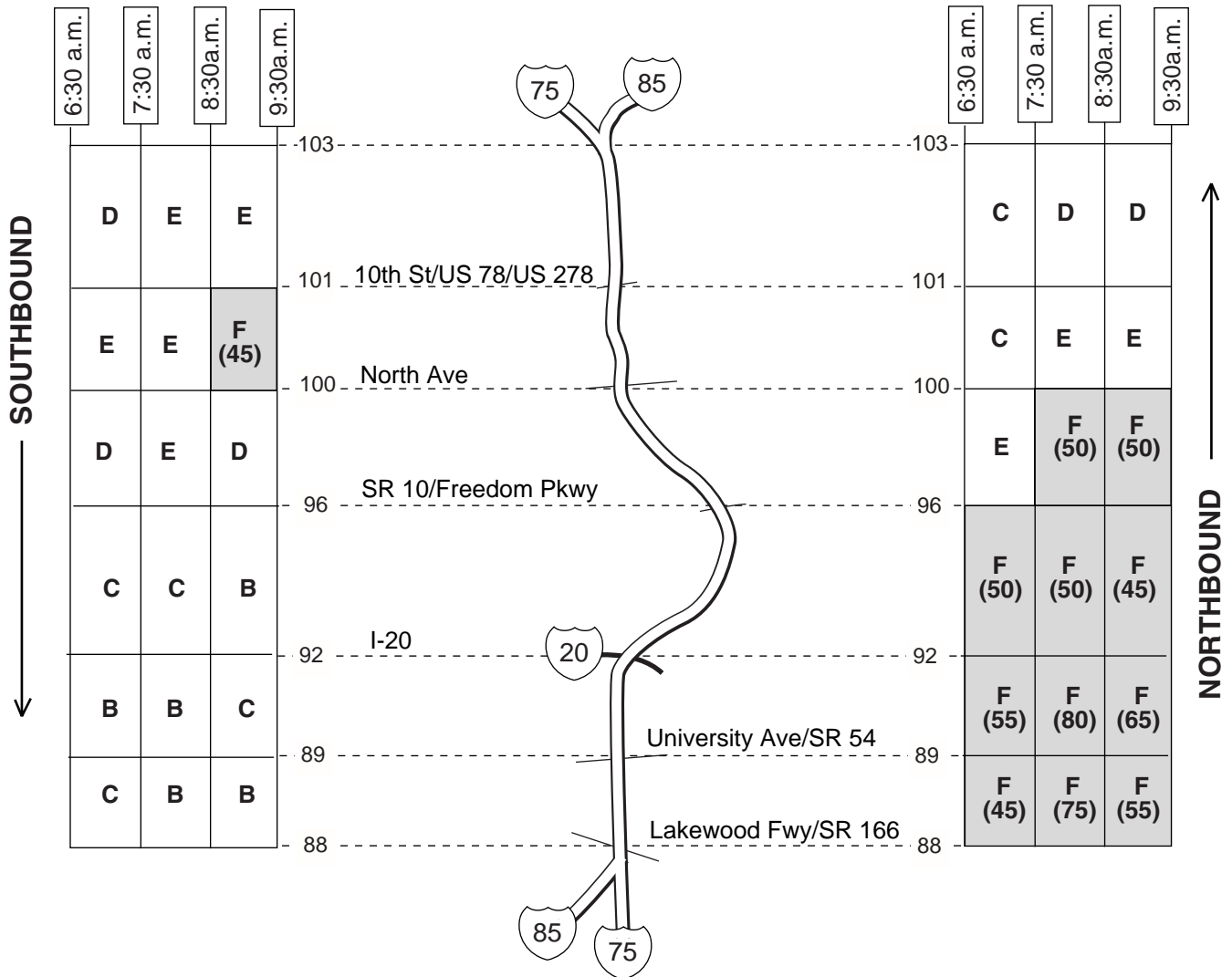
I-75 (NORTH) MORNING (FALL 1998)



I-75 / 85 MORNING (FALL 1998)

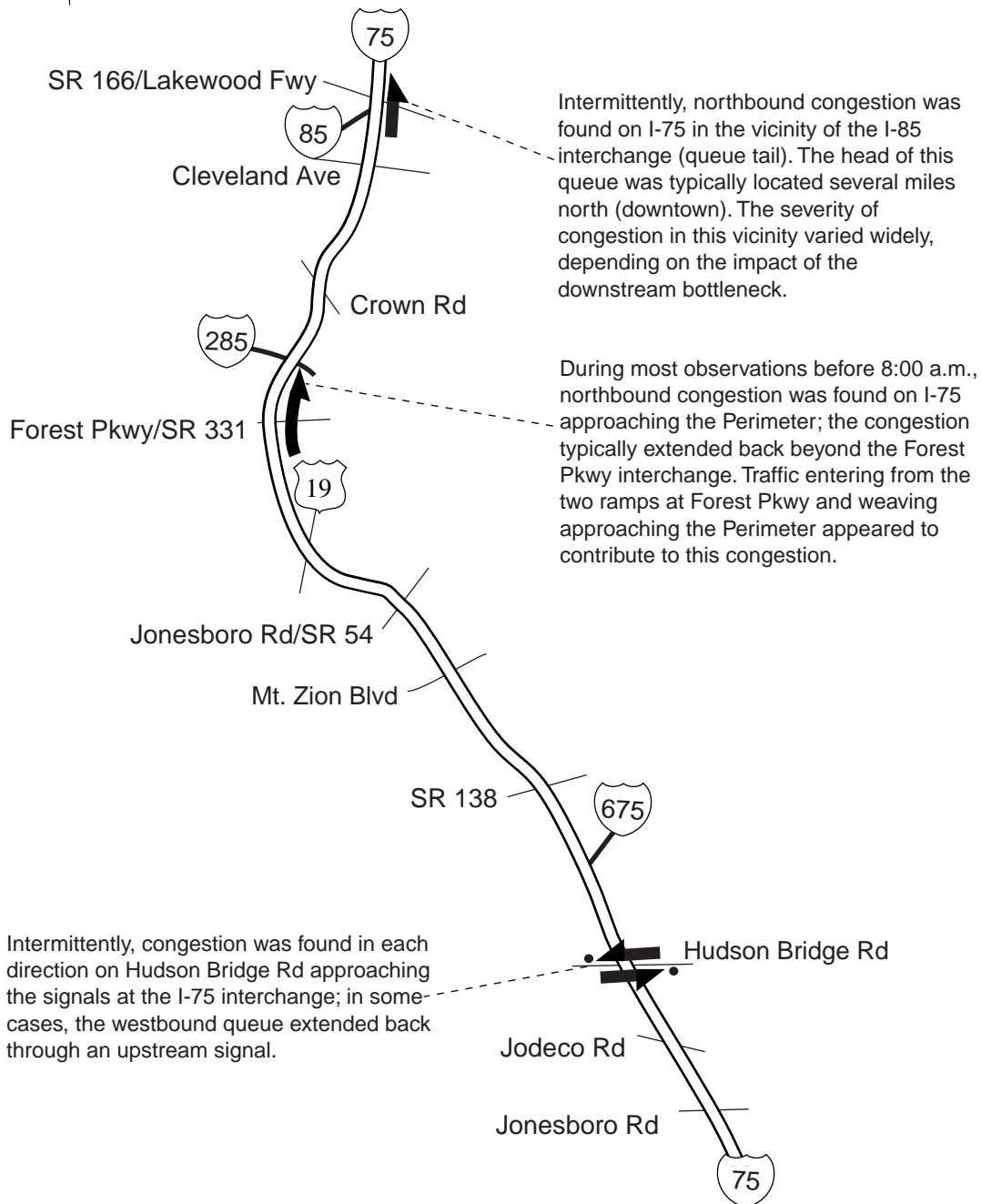


I-75 / 85 MORNING (FALL 1998)





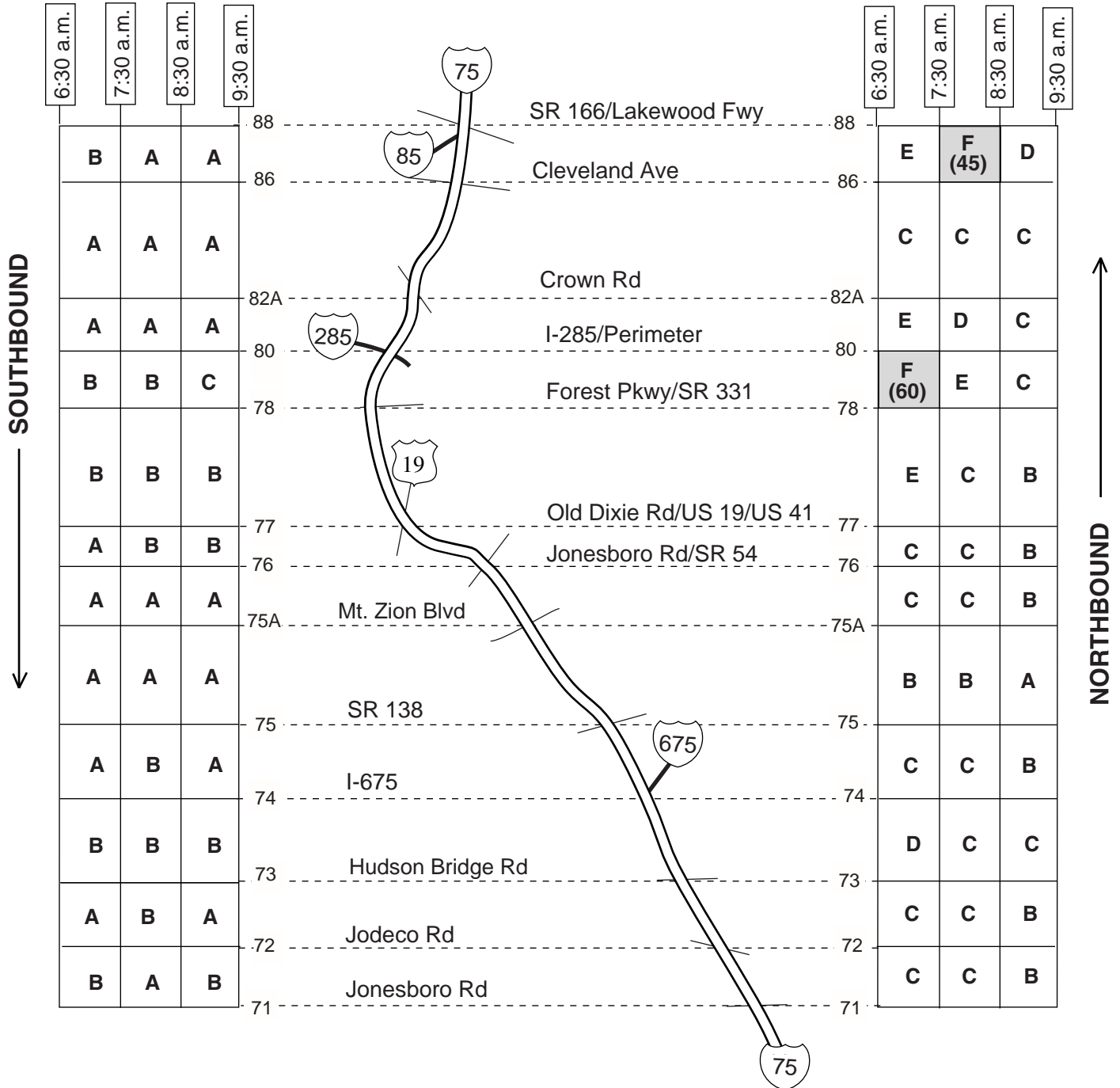
I-75 (SOUTH) MORNING (FALL 1998)



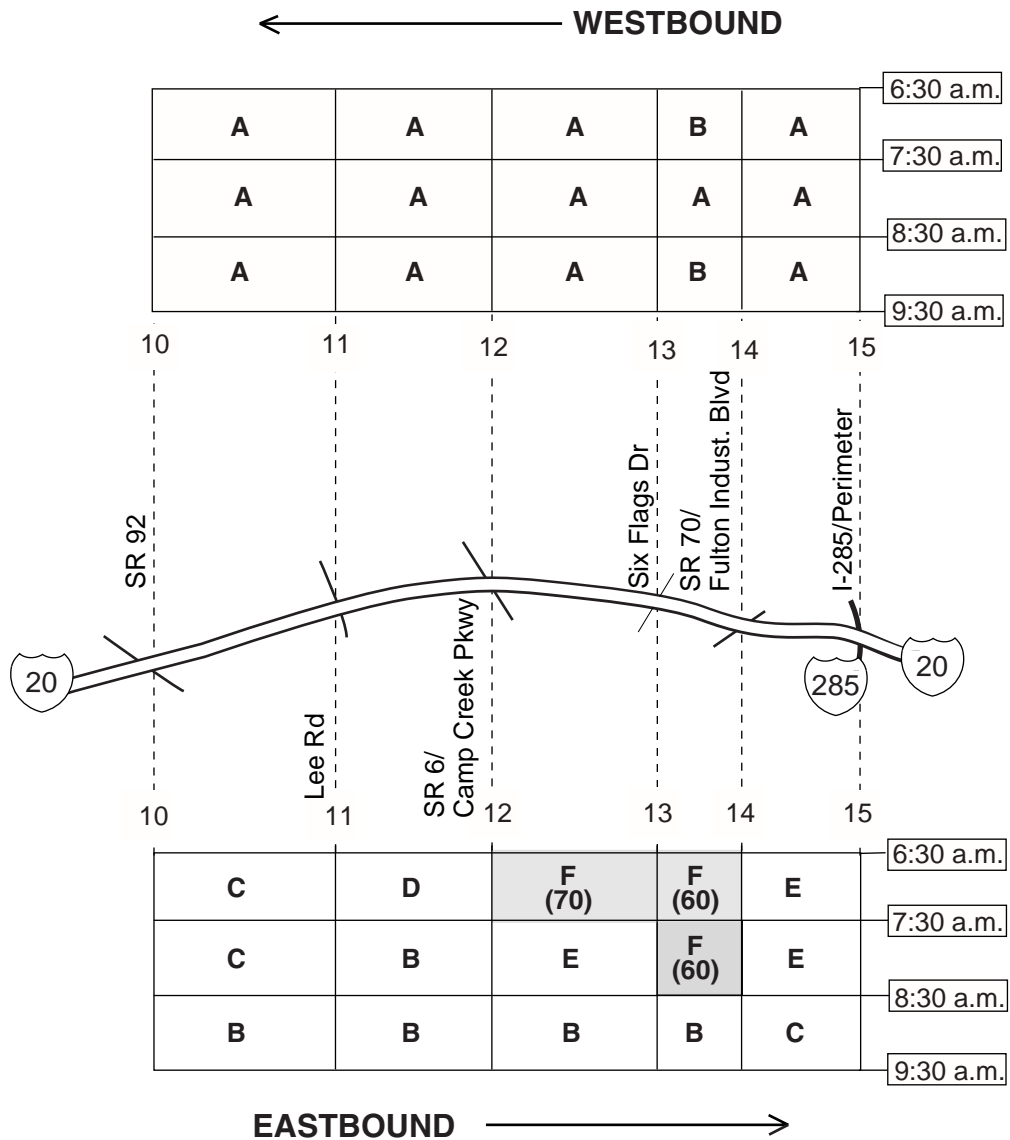
FREEWAY TRAFFIC QUALITY

- Heavy traffic flow or intermittent congestion
- Congested traffic flow

I-75 (SOUTH) MORNING (FALL 1998)

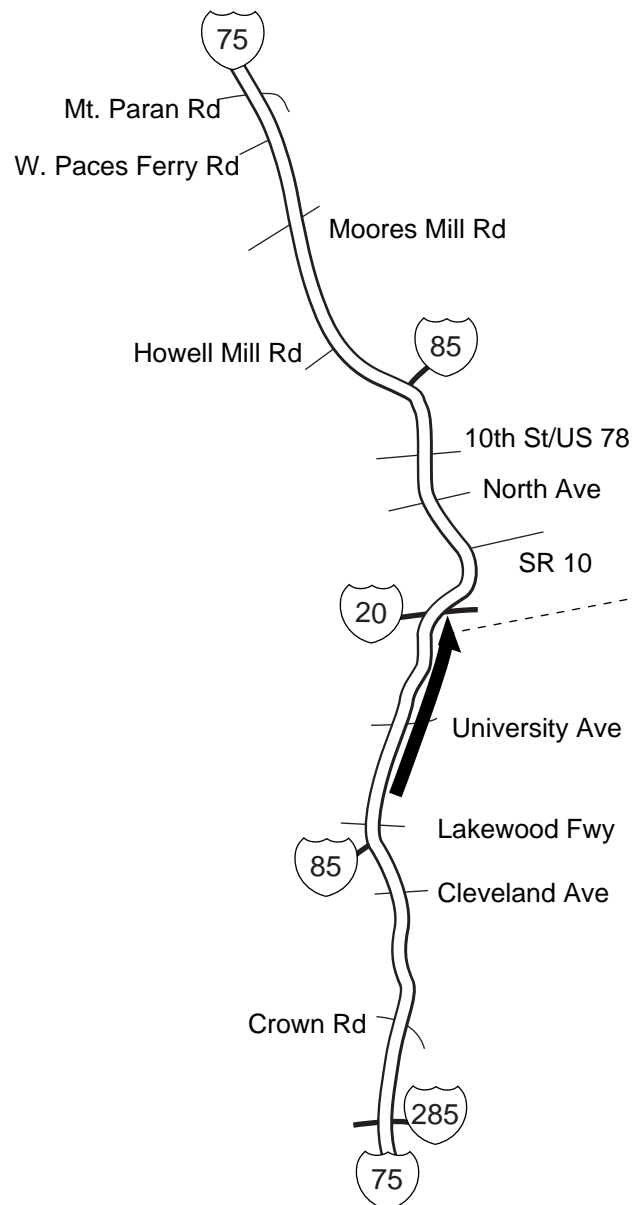


I-20 (WEST OF PERIMETER) MORNING (FALL 1998)







I-75 (HOV) MORNING (FALL 1998)



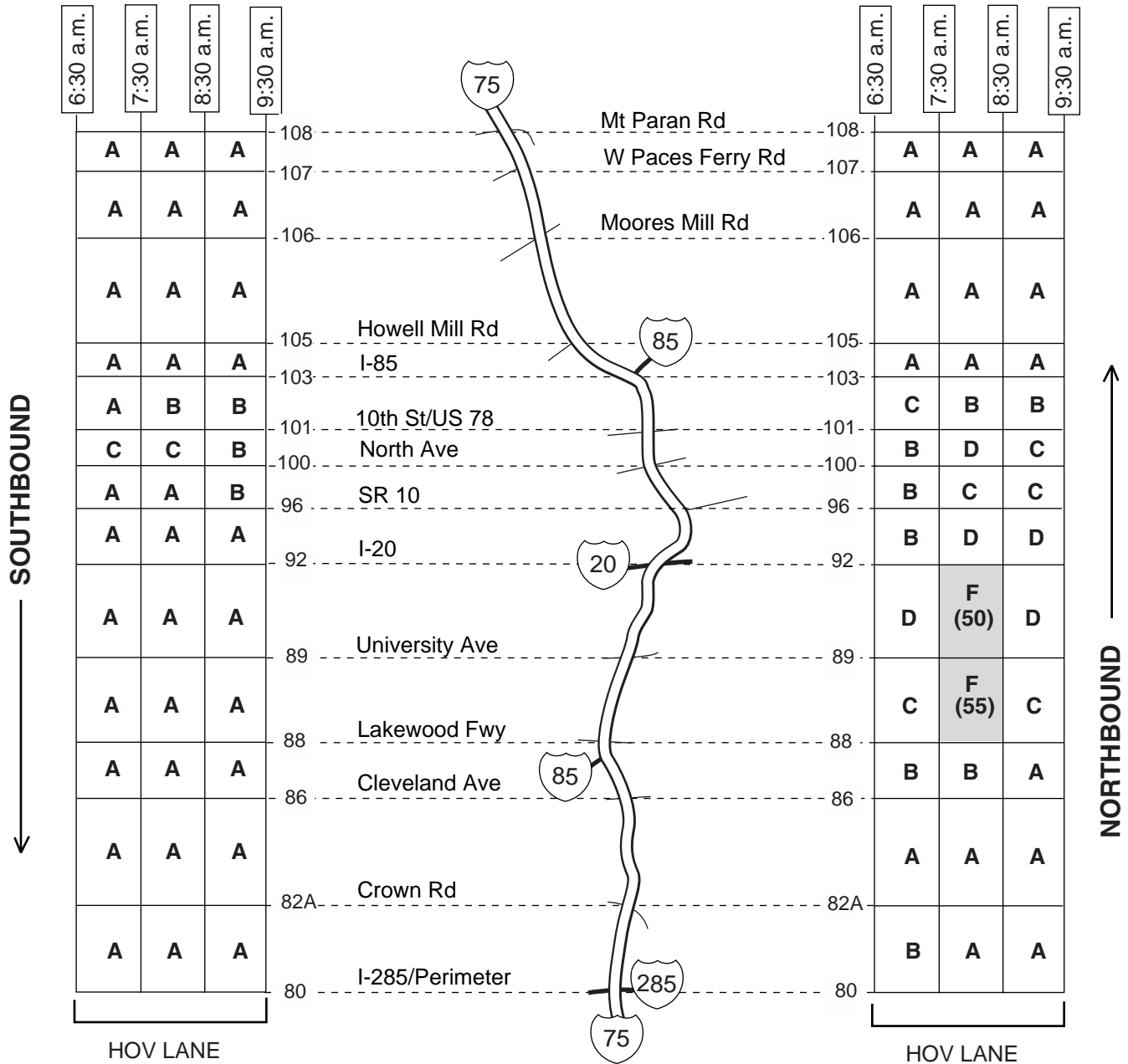
When the mainline of I-75 was congested (northbound), intermittent congestion was found in the HOV lane between the vicinity of Lakewood Fwy and I-20. Two separate lane drops (6 to 5 to 4 lanes) occur on the mainline along this section of I-75. North of I-20, the HOV lane operated free of congestion during all observations. (See photos 57 - 64.JPG)

FREEWAY TRAFFIC QUALITY

-  Heavy traffic flow or intermittent congestion
-  Congested traffic flow

I-75 (HOV)

MORNING (FALL 1998)





I-85 (NORTH) MORNING (FALL 1998)

Intermittently, the southbound exit ramp at Lawrenceville Rd was congested (left lane only); vehicles were queued at the signal at the head of the ramp. When congested, queue populations typically ranged from approximately 20-30 vehicles. (See photo 76.JPG)

Intermittently, moderate to severe southbound congestion was found on Satellite Blvd approaching the pair of signals at Old Norcross and Eldridge Rd; the maximum observed queue population exceeded 70 vehicles per lane (two lanes). (See photos 77 - 80.JPG)

During most observations before 8:30 a.m., moderate to severe southbound congestion was found on I-85 between the vicinity of Duluth Hwy and Indian Trail Rd; average estimated speeds within this zone of congestion typically ranged from approximately 20-40 mph. Two primary bottlenecks were identified: first at the merge with traffic entering from SR 316 and again downstream where traffic merged from the closely spaced ramps at Pleasant Hill Rd and Steve Reynolds Blvd. South of Indian Trail Rd, traffic flow generally improved. (See photos 81 - 85.JPG)

During most observations, southbound congestion was found on SR 13 approaching the pair of signals at Cheshire Bridge Rd and Sydney Marcus Blvd. Downstream, congestion was again encountered on Buford Hwy at the merge with traffic entering from the I-85 flyover ramp.

During most observations, southbound congestion was found on I-85 between the vicinity of Clairmont Rd and I-75; estimated average speeds ranged from approximately 30-50 mph. The primary bottleneck was at the merge with traffic entering from SR 400; intermittent stop-and-go conditions were found approaching this merge. South of SR 400, traffic flow typically improved. (See photos 95 - 97.JPG)

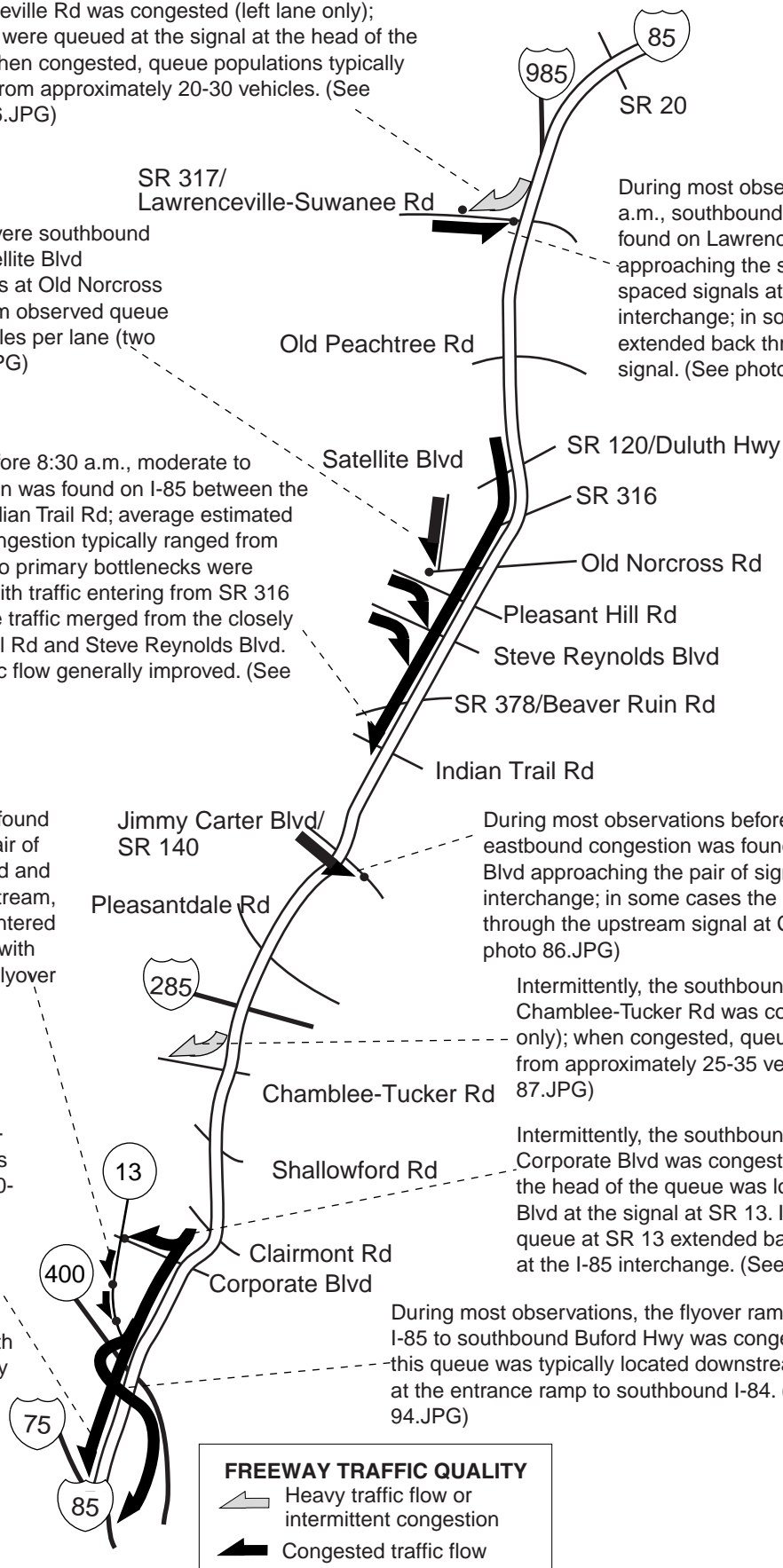
During most observations before 8:00 a.m., southbound congestion was found on Lawrenceville Rd approaching the series of closely spaced signals at the I-85 interchange; in some cases, the queue extended back through an upstream signal. (See photo 76.JPG)

During most observations before 8:00 a.m., eastbound congestion was found on Jimmy Carter Blvd approaching the pair of signals at the I-85 interchange; in some cases the queue extended back through the upstream signal at Crescent Dr. (See photo 86.JPG)

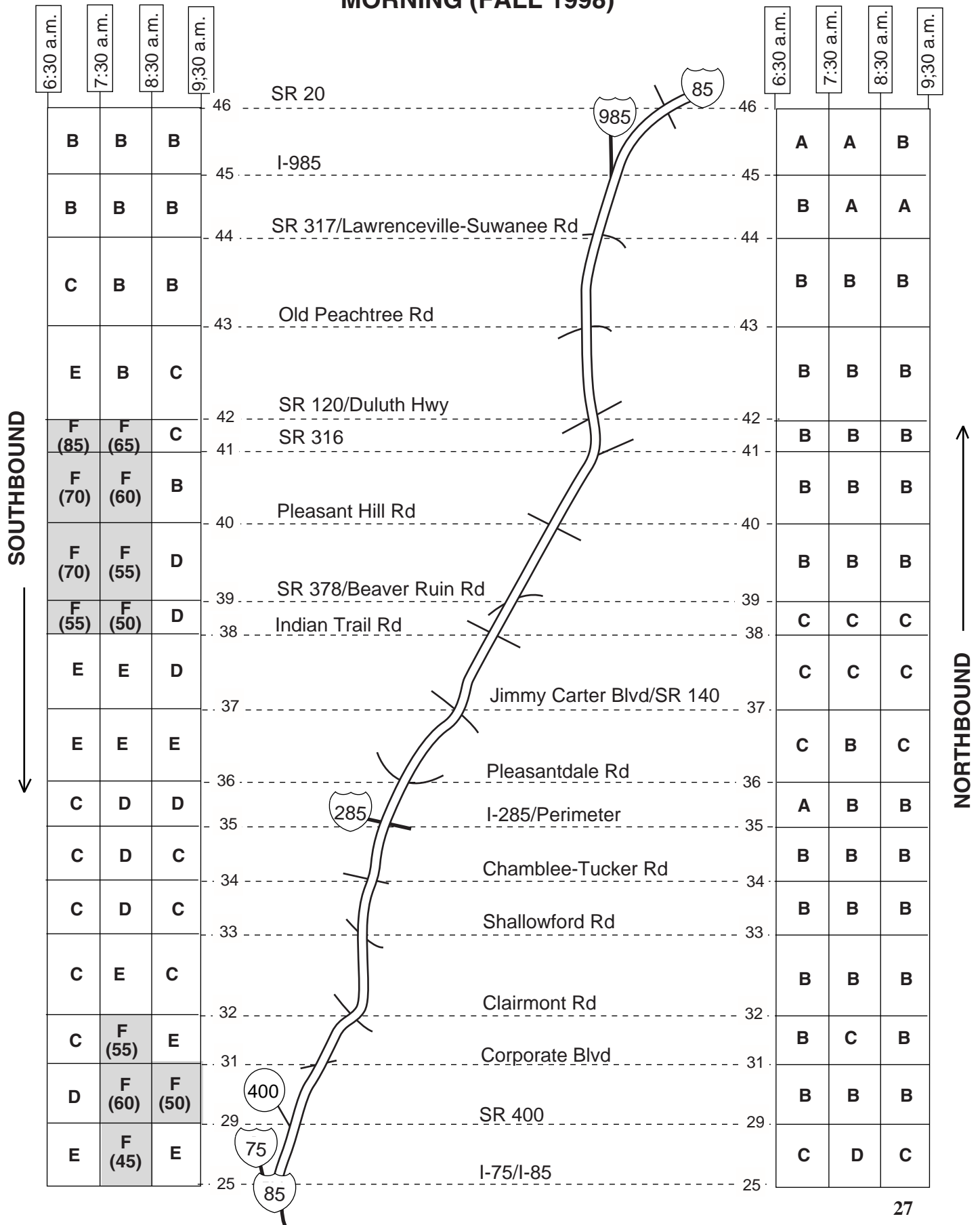
Intermittently, the southbound exit ramp at Chamblee-Tucker Rd was congested (right lane only); when congested, queue populations ranged from approximately 25-35 vehicles. (See photo 87.JPG)

Intermittently, the southbound exit ramp at Corporate Blvd was congested; when congested, the head of the queue was located on Corporate Blvd at the signal at SR 13. In some cases, the queue at SR 13 extended back through the signal at the I-85 interchange. (See photos 88 - 89.JPG)

During most observations, the flyover ramp from southbound I-85 to southbound Buford Hwy was congested; the head of this queue was typically located downstream on Buford Hwy at the entrance ramp to southbound I-84. (See photos 90 - 94.JPG)



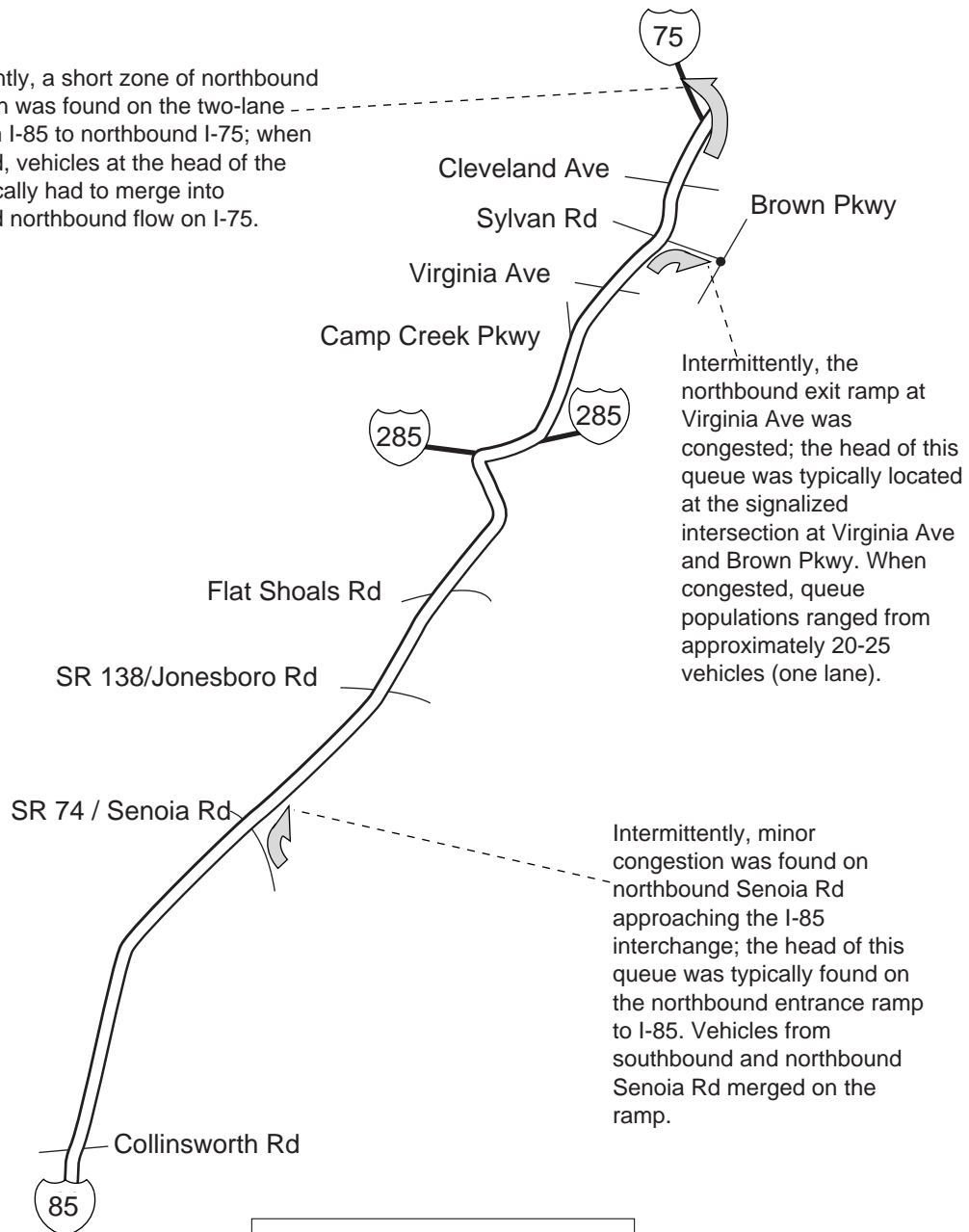
I-85 (NORTH) MORNING (FALL 1998)



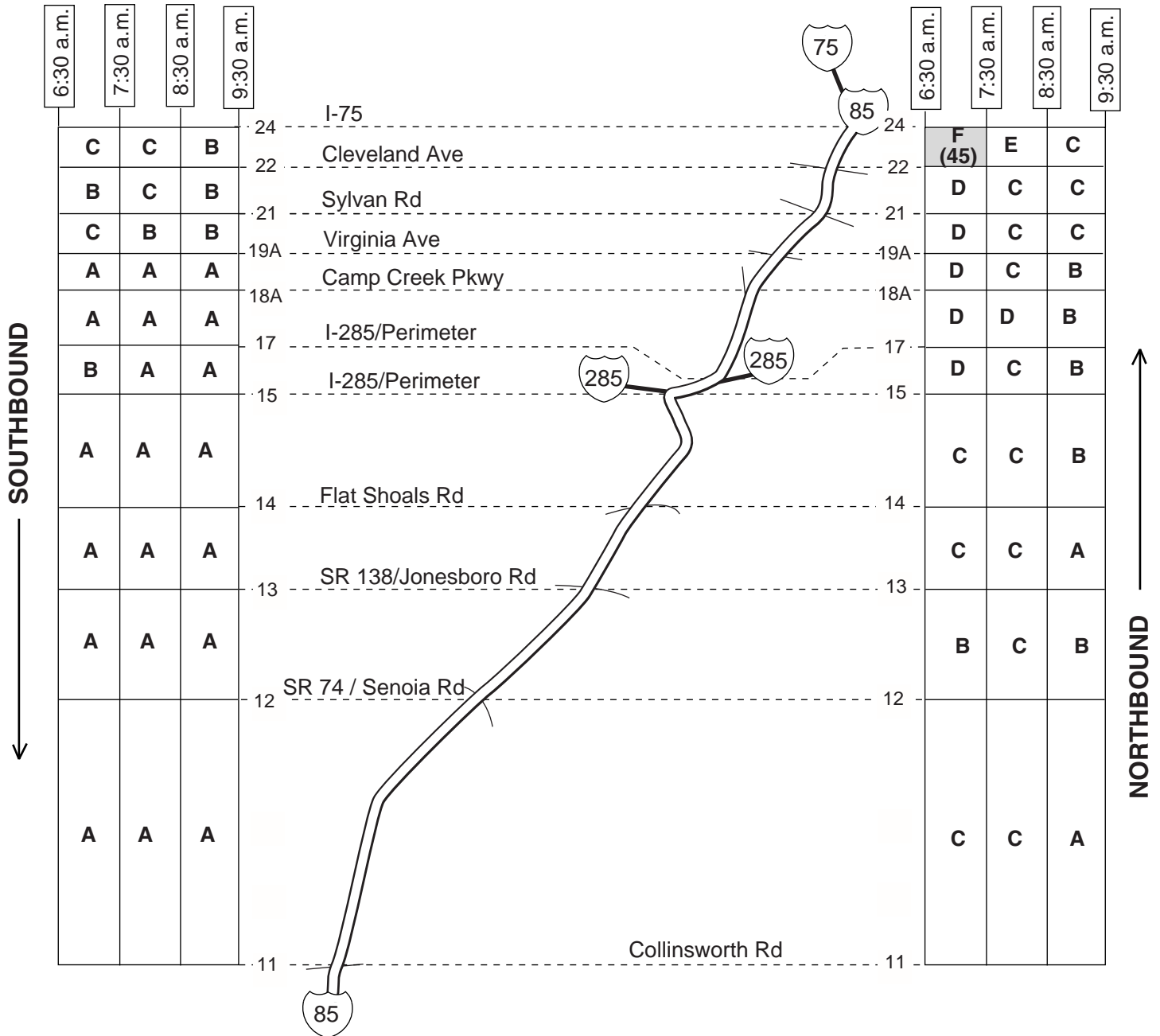


I-85 (SOUTH) MORNING (FALL 1998)

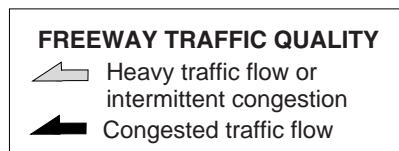
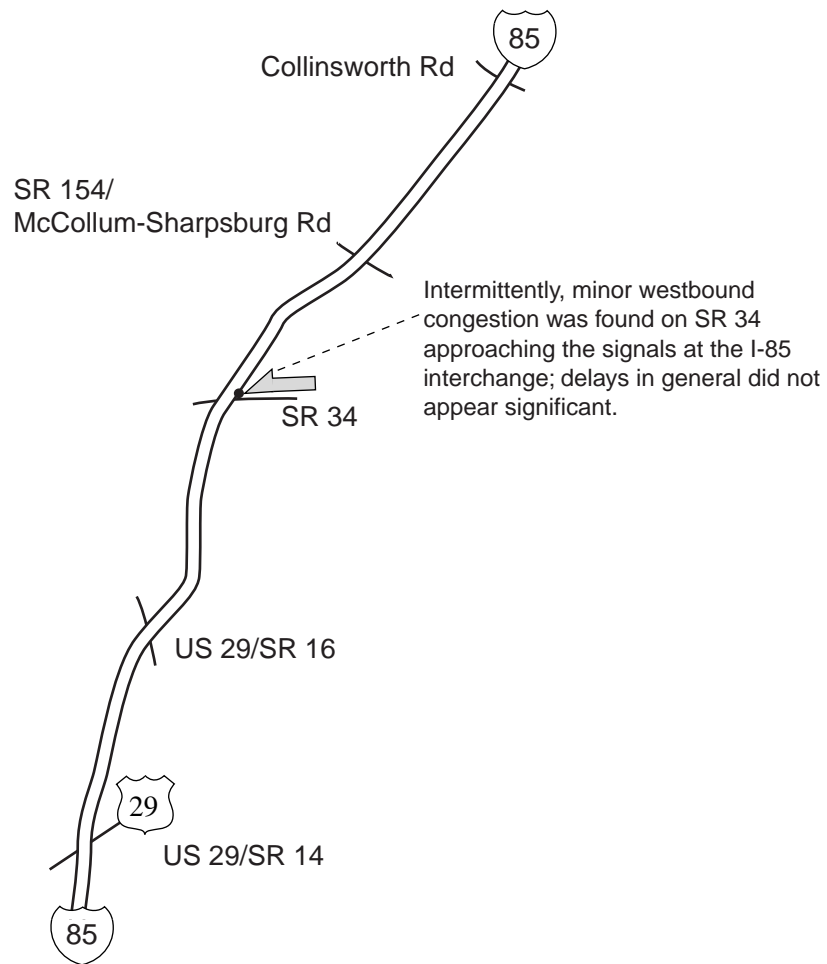
Intermittently, a short zone of northbound congestion was found on the two-lane ramp from I-85 to northbound I-75; when congested, vehicles at the head of the ramp typically had to merge into congested northbound flow on I-75.



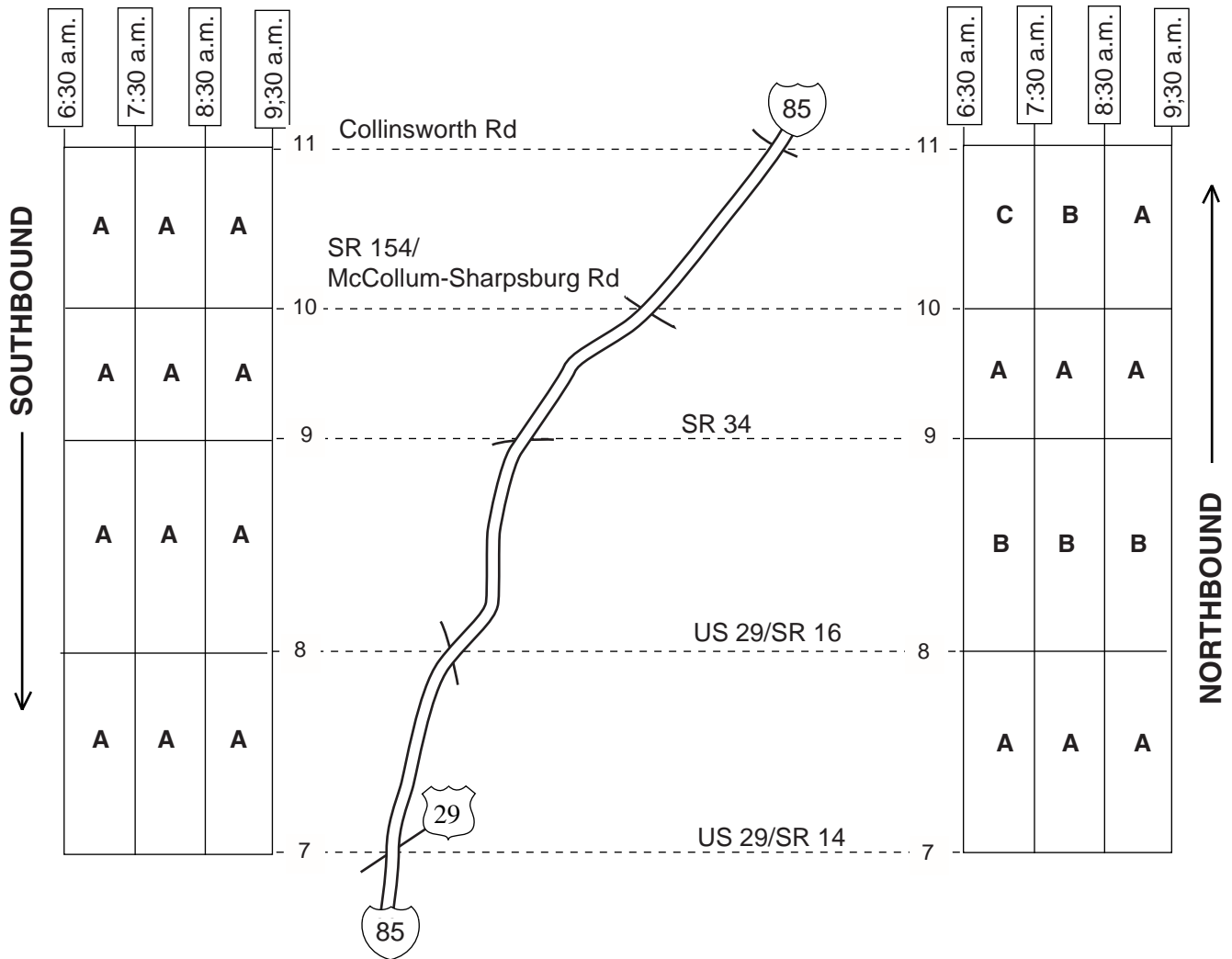
I-85 (SOUTH) MORNING (FALL 1998)



I-85 (FAR SOUTH) MORNING (FALL 1998)

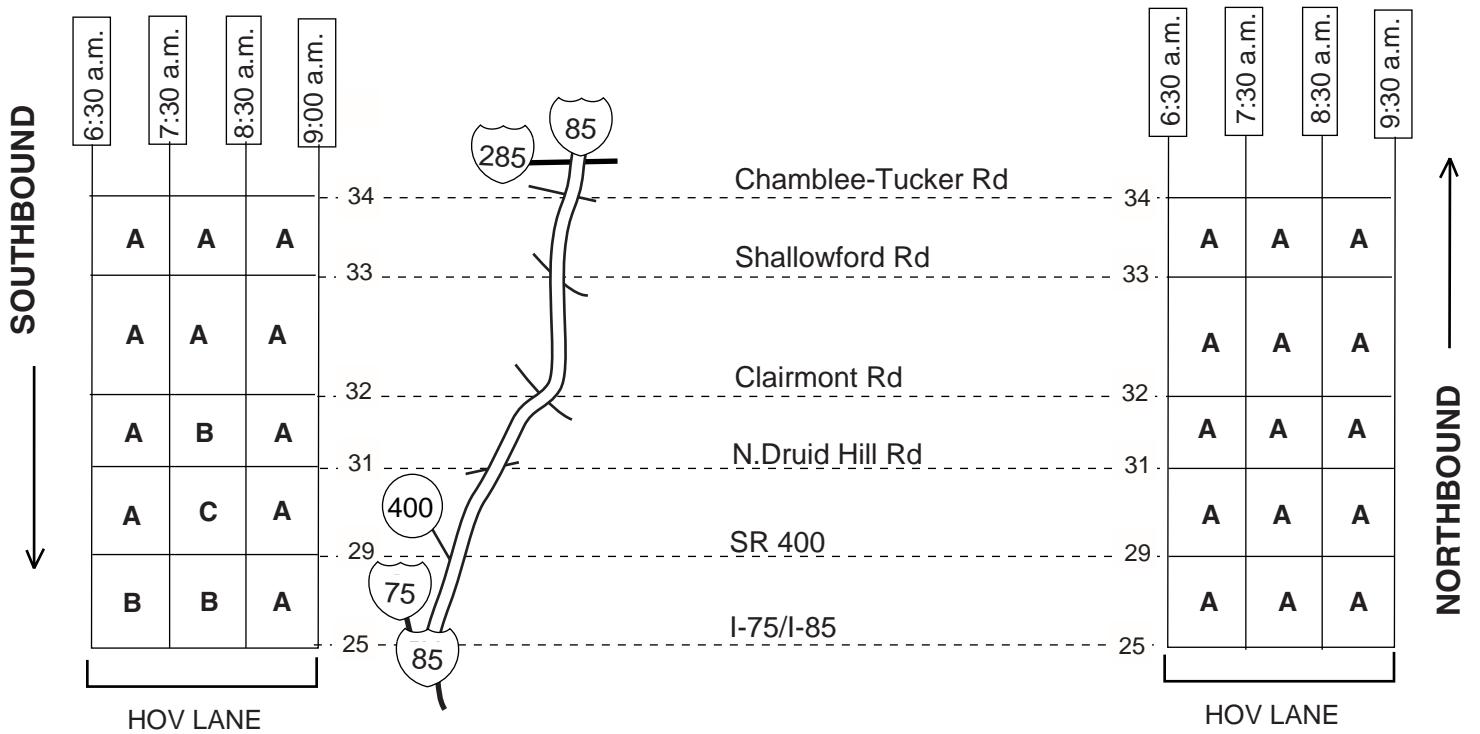


I-85 (FAR SOUTH) MORNING (FALL 1998)



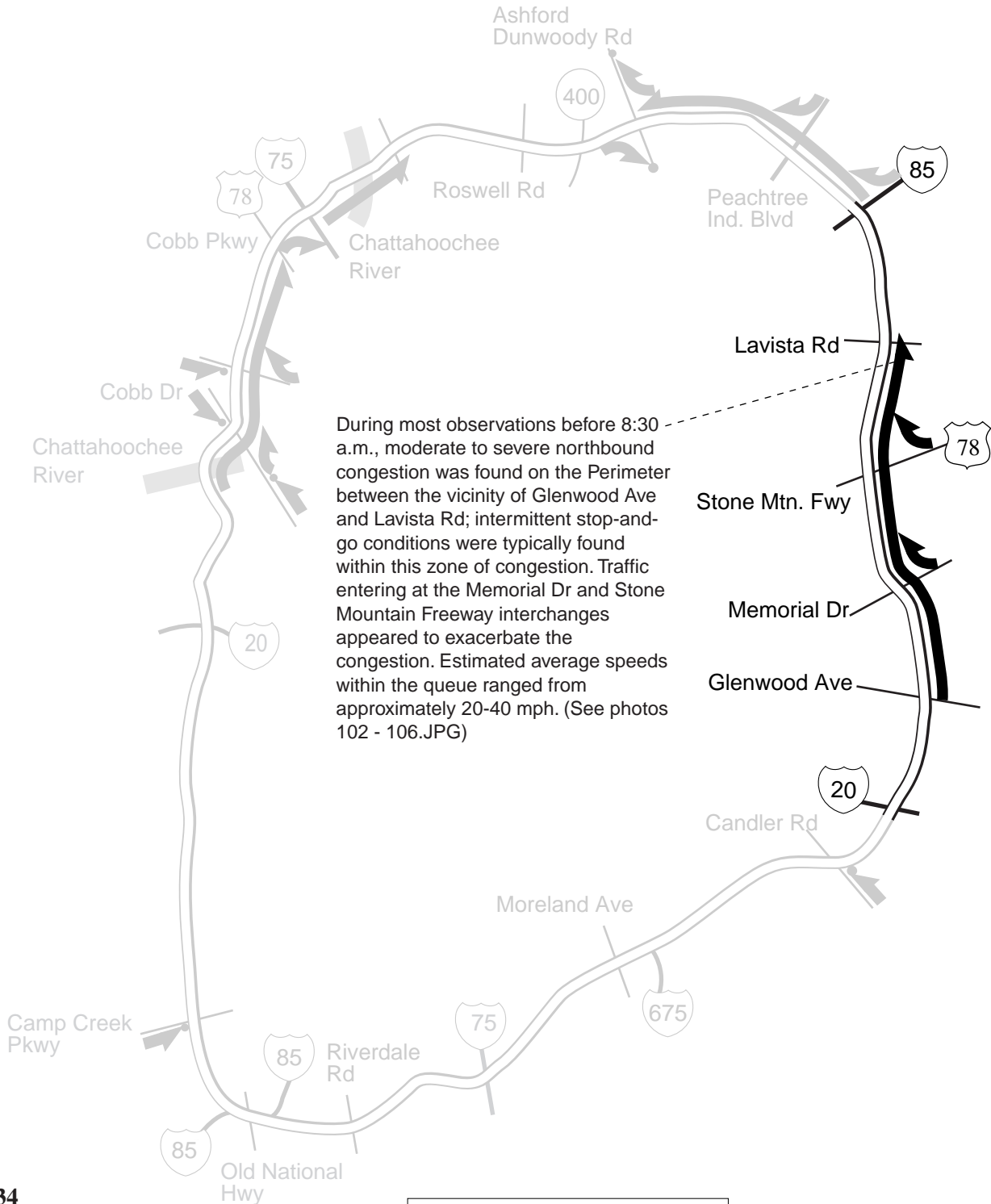
I-85 HOV

MORNING (FALL 1998)

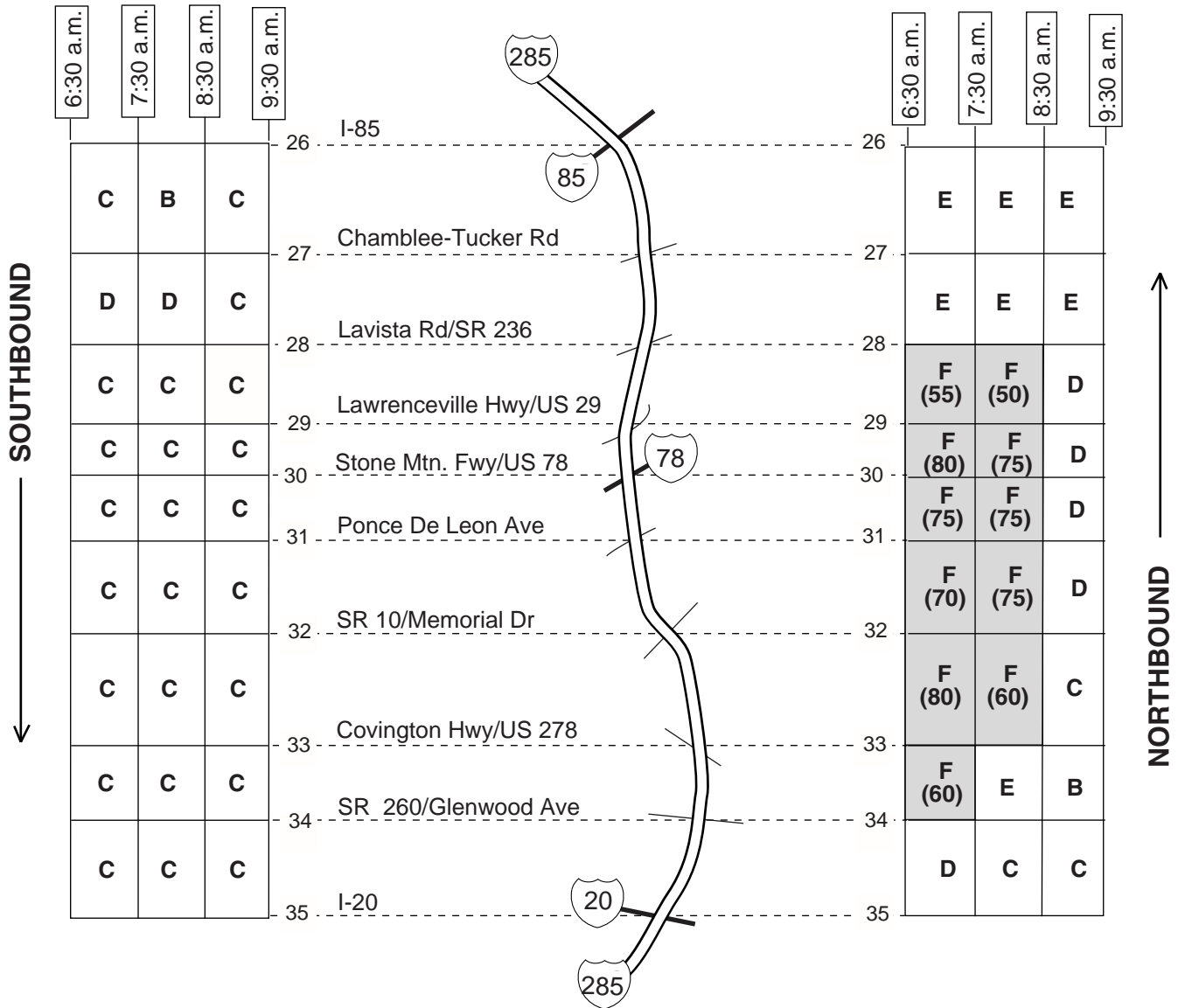




PERIMETER - EAST (I-285) MORNING (FALL 1998)

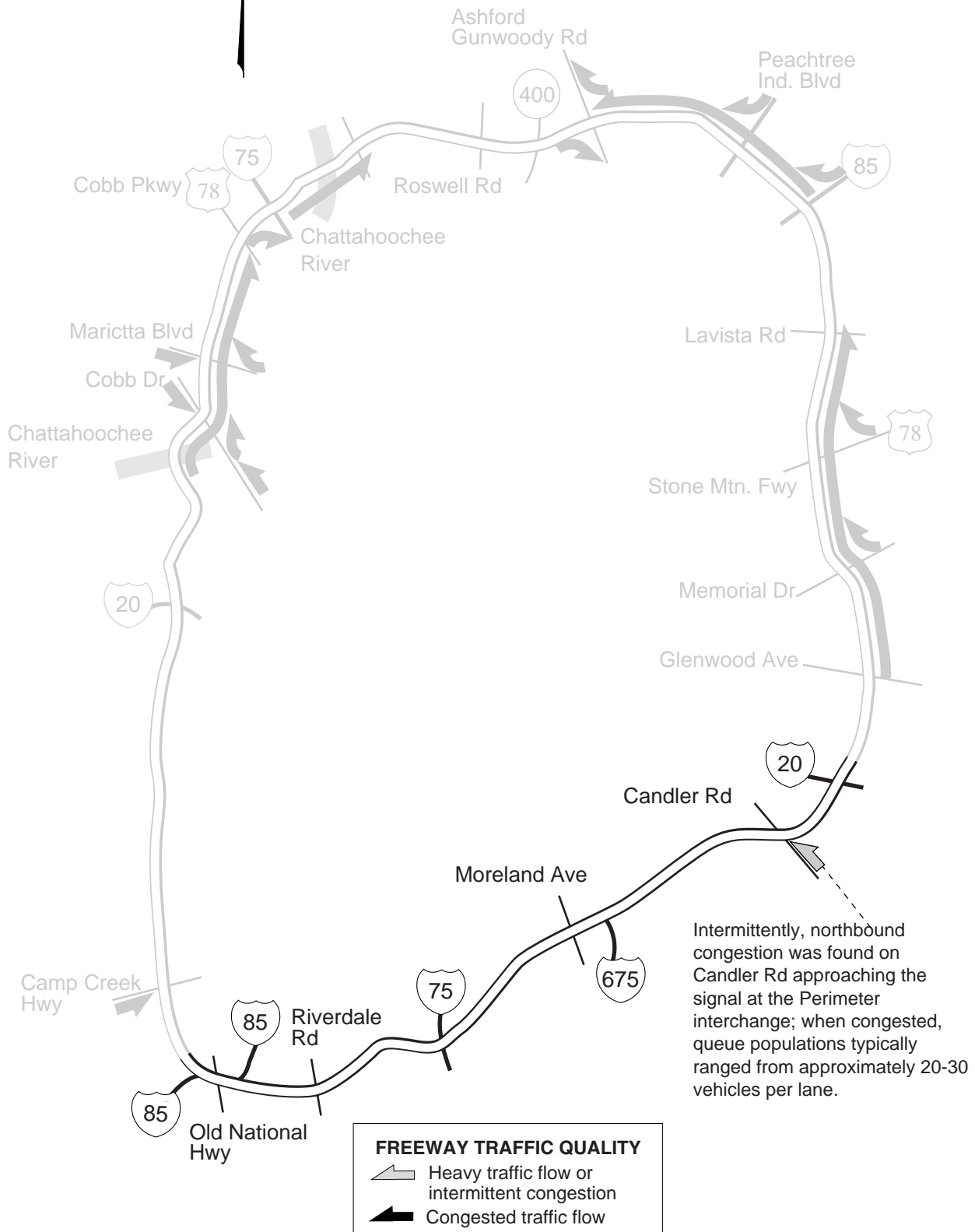


PERIMETER - EAST (I-285) MORNING (FALL 1998)

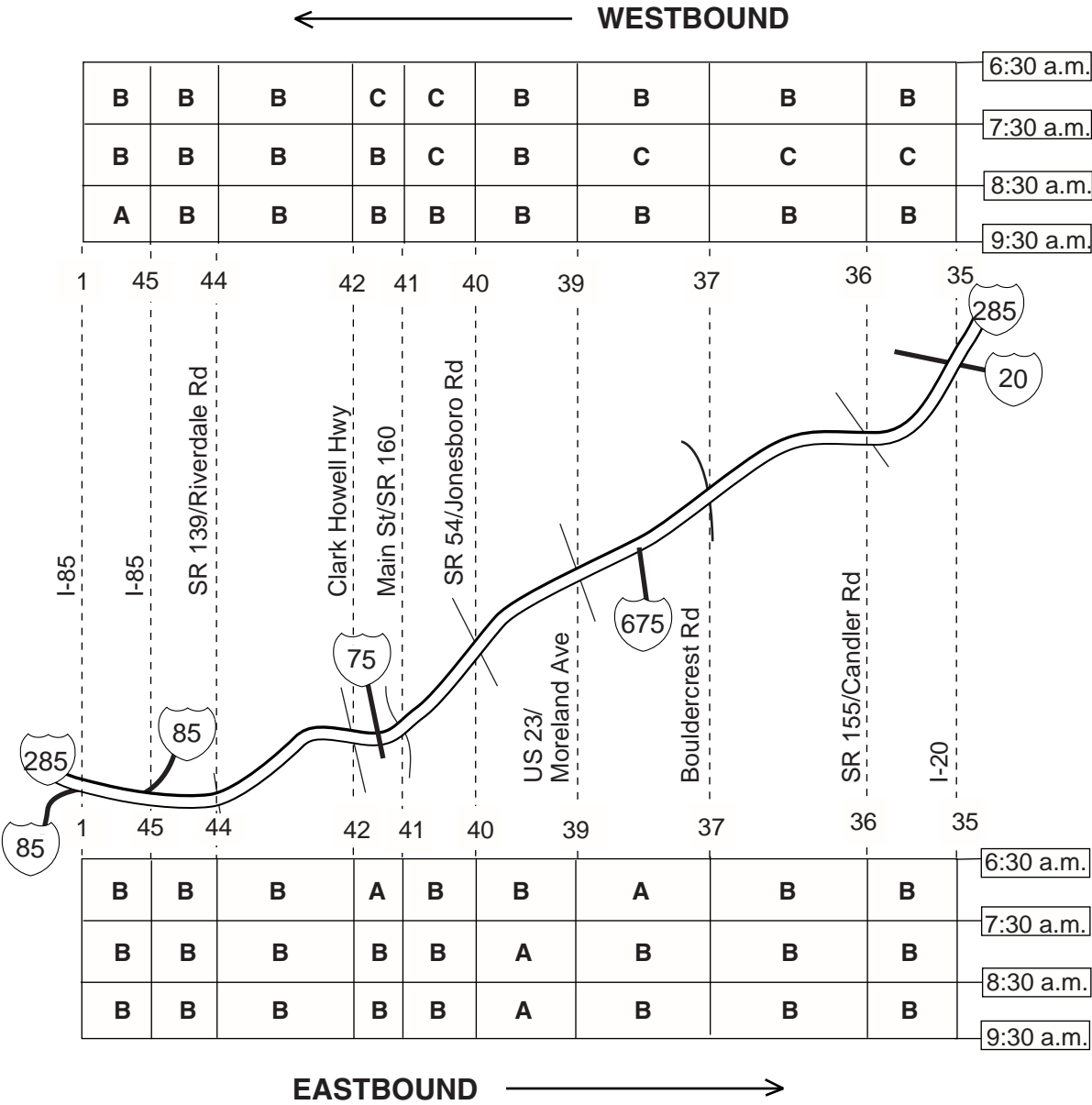




PERIMETER - SOUTH (I-285) MORNING (FALL 1998)

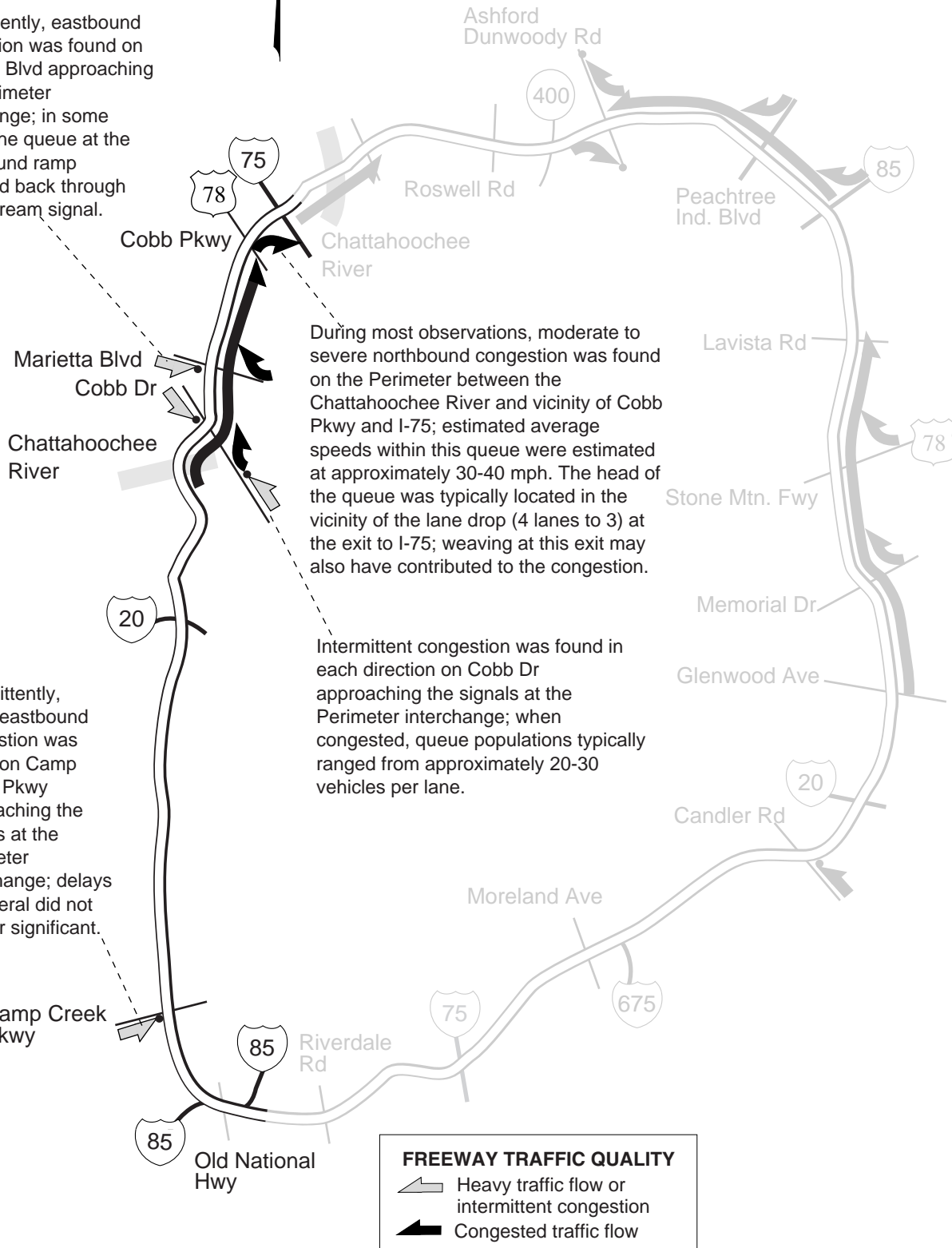


PERIMETER - SOUTH (I-285) MORNING (FALL 1998)

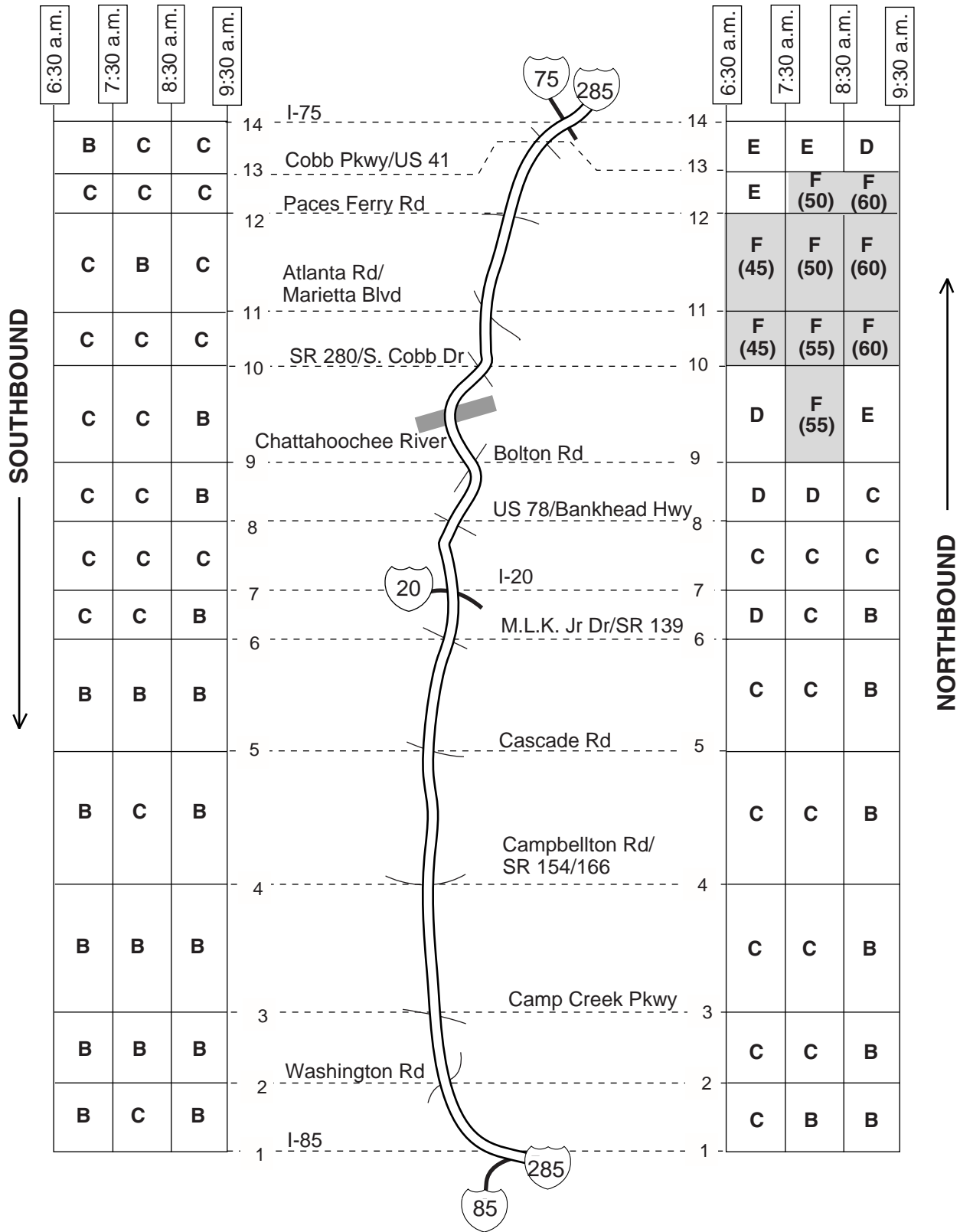


PERIMETER - WEST (I-285) MORNING (FALL 1998)

Intermittently, eastbound congestion was found on Marietta Blvd approaching the Perimeter interchange; in some cases, the queue at the northbound ramp extended back through the upstream signal.



PERIMETER - WEST (I-285) MORNING (FALL 1998)

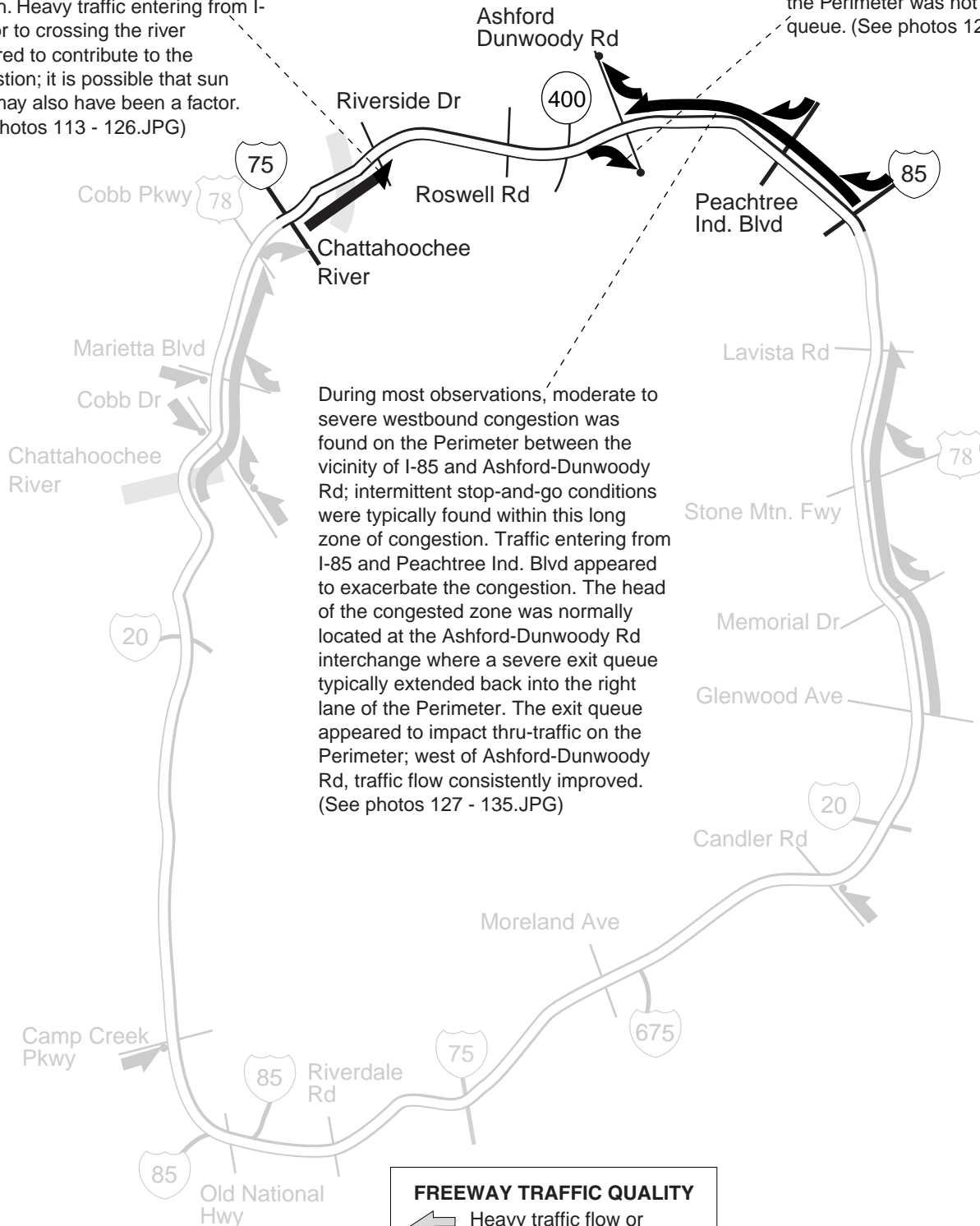




PERIMETER - NORTH (I-285) MORNING (FALL 1998)

During most observations before 8:30 a.m., moderate to severe eastbound congestion was found on the Perimeter between the I-75 and the vicinity of Riverside Dr; estimated average speeds within this queue were estimated at approximately 30-40 mph. Heavy traffic entering from I-75 prior to crossing the river appeared to contribute to the congestion; it is possible that sun glare may also have been a factor. (See photos 113 - 126.JPG)

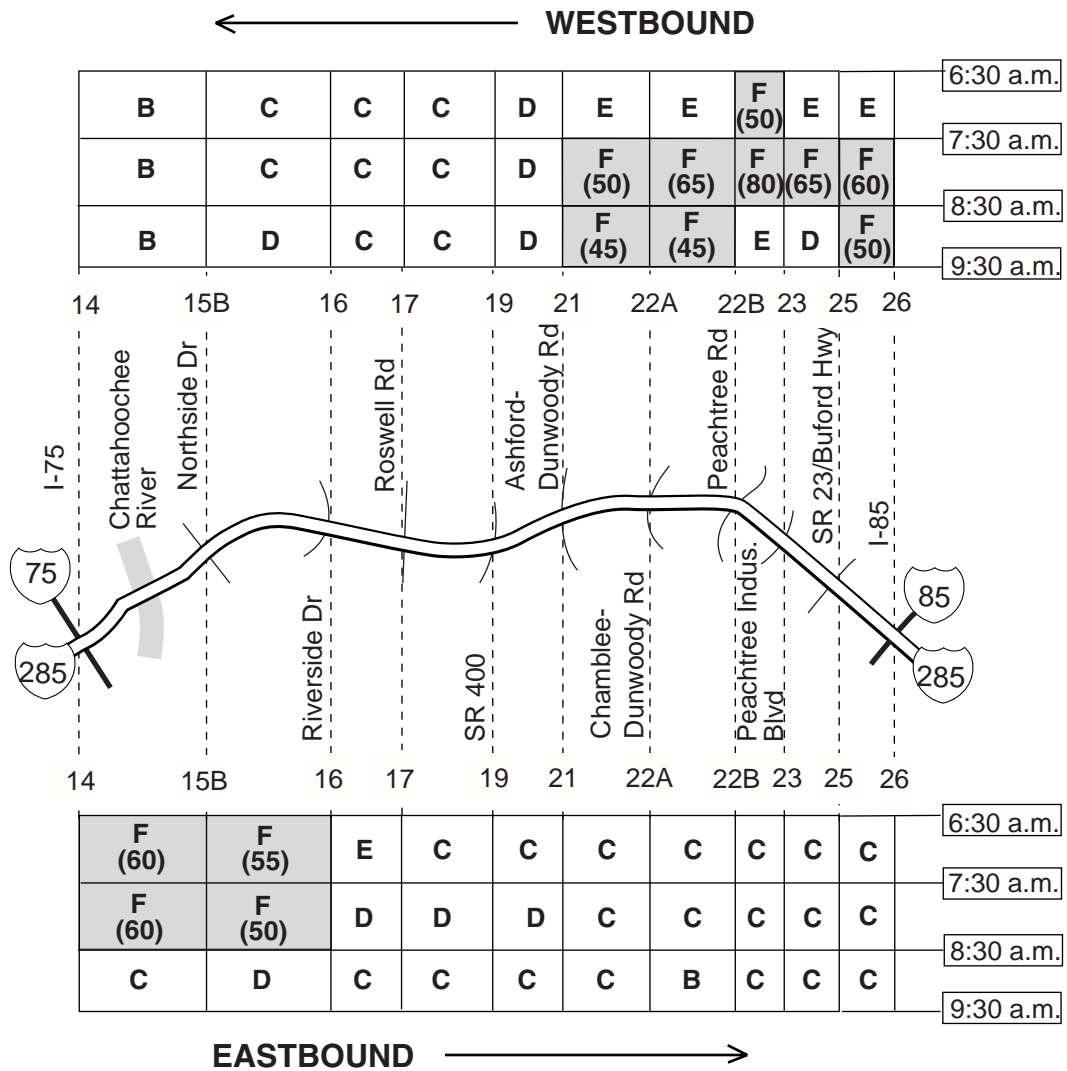
During most observations, the eastbound exit ramp at Ashford-Dunwoody Rd was congested; in some cases, severe queuing extended back into the right lane of Perimeter. However, thru-traffic on the Perimeter was not affected by this queue. (See photos 127 - 135.JPG)



FREEWAY TRAFFIC QUALITY

- Heavy traffic flow or intermittent congestion
- Congested traffic flow

PERIMETER - NORTH (I-285) MORNING (FALL 1998)





SR 400 MORNING (FALL 1998)

During most observations, moderate to severe southbound congestion was found on Dunwoody Place approaching the signalized intersection at the SR 400 interchange; the maximum observed queue exceeded 100 vehicles per lane (2 lanes). (See photos 138 - 140.JPG)

During most observations before 8:30 a.m., moderate to severe southbound congestion was found on SR 400 between Cumming St and the vicinity of Abernathy Rd; southbound travelers along this zone of congestion encountered extensive delays. Heavy traffic entering at the interchange at Northridge, Mansell and Holcomb Bridge Rd appeared to exacerbate the congestion; intermittent stop-and-go conditions were typically found in the vicinity of these interchanges. South of Abernathy Rd, traffic flow typically improved. (See photos 141 - 148.JPG)

During most observations, the flyover ramp from southbound I-85 to southbound Buford Hwy was congested; the head of this queue was typically located downstream on Buford Hwy at the entrance ramp to southbound I-85. (See photos I-85)

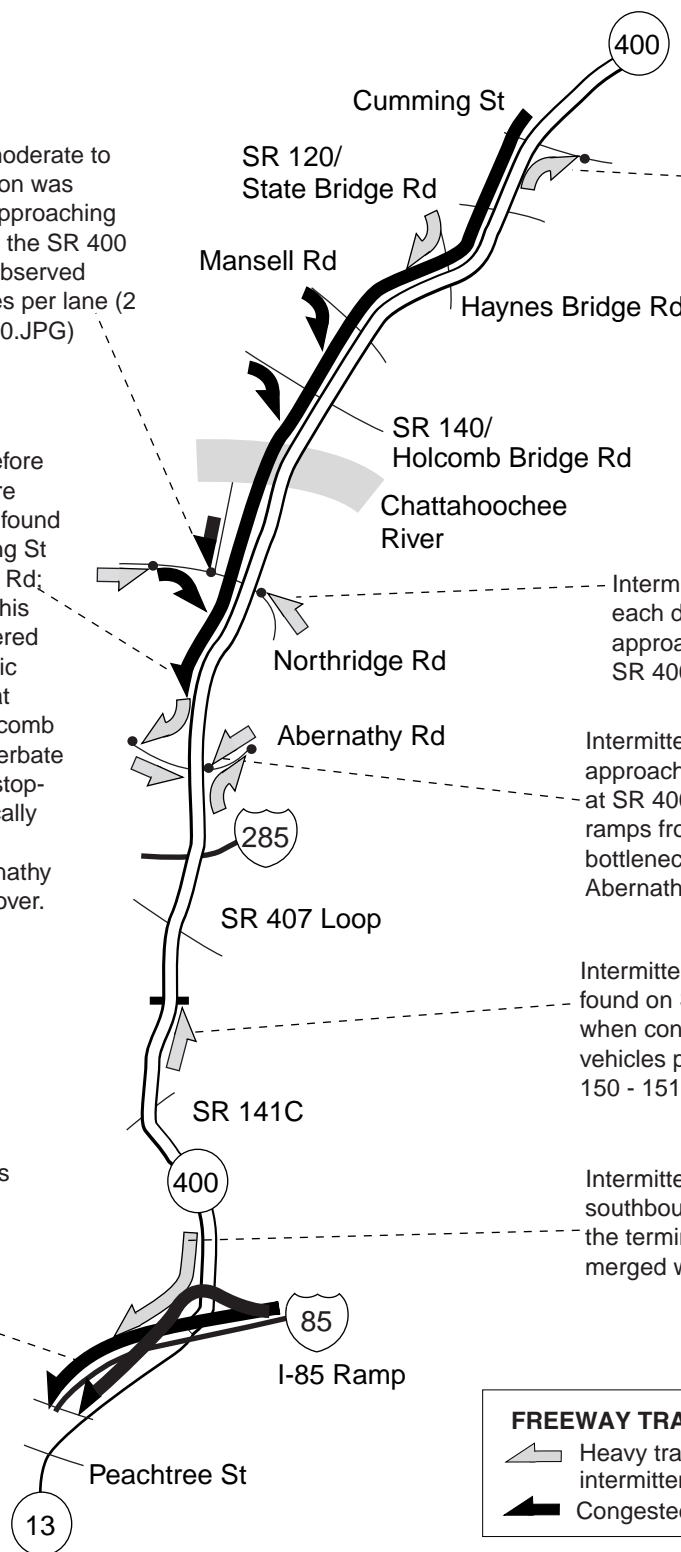
Intermittently, the northbound exit ramp at Cumming St was congested; when congested, vehicles were queued at the signal at the head of the ramp. (See photos 136 - 137.JPG)

Intermittently, minor congestion was found in each direction on Northridge Rd approaching the signalized intersections at SR 400. (See photo 149.JPG)

Intermittently, congestion was found on all approaches to the signalized intersections at SR 400 / Abernathy Rd (including the ramps from SR 400). The primary bottleneck appeared to be the signal at Abernathy Rd just east of the interchange.

Intermittently, northbound congestion was found on SR 400 approaching the toll plaza; when congested, approximately 15-25 vehicles per lane were queued. (See photos 150 - 151.JPG)

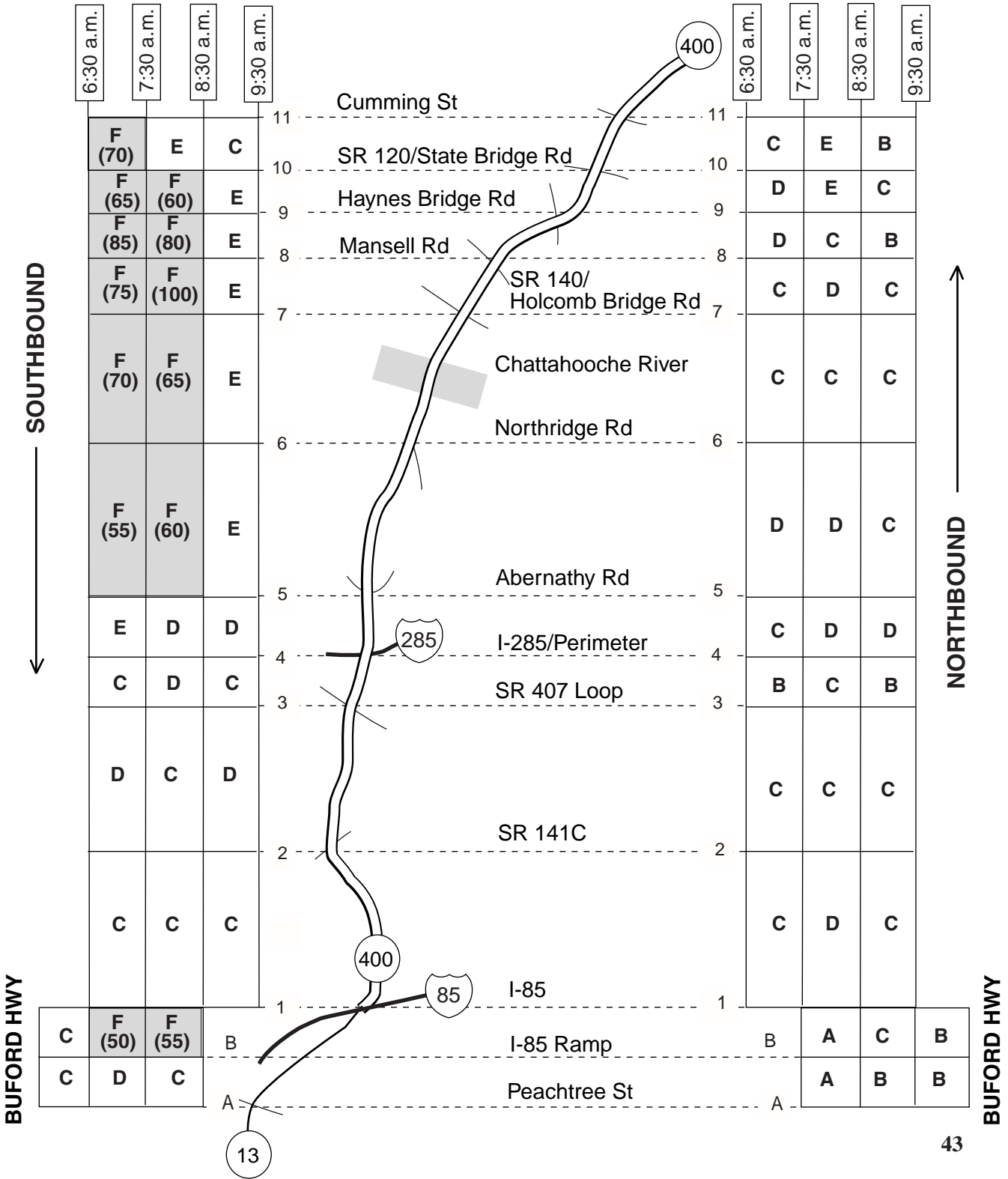
Intermittently, a short zone of southbound congestion was found at the terminus of SR 400 where traffic merged with southbound traffic on I-85.



FREEWAY TRAFFIC QUALITY

- Heavy traffic flow or intermittent congestion
- Congested traffic flow

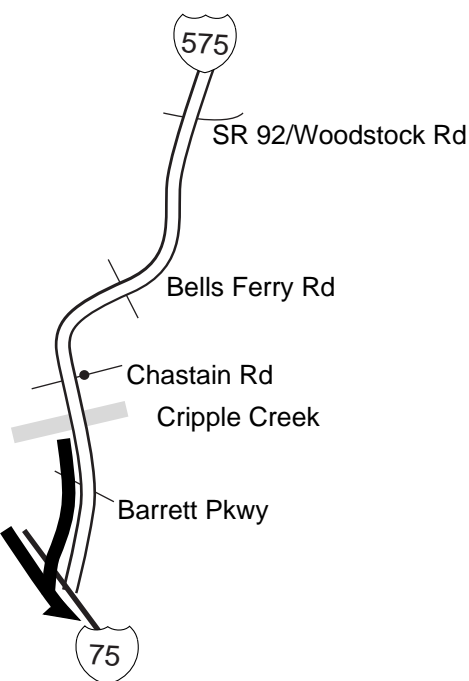
SR 400
MORNING (FALL 1998)







I-575 MORNING (FALL 1998)

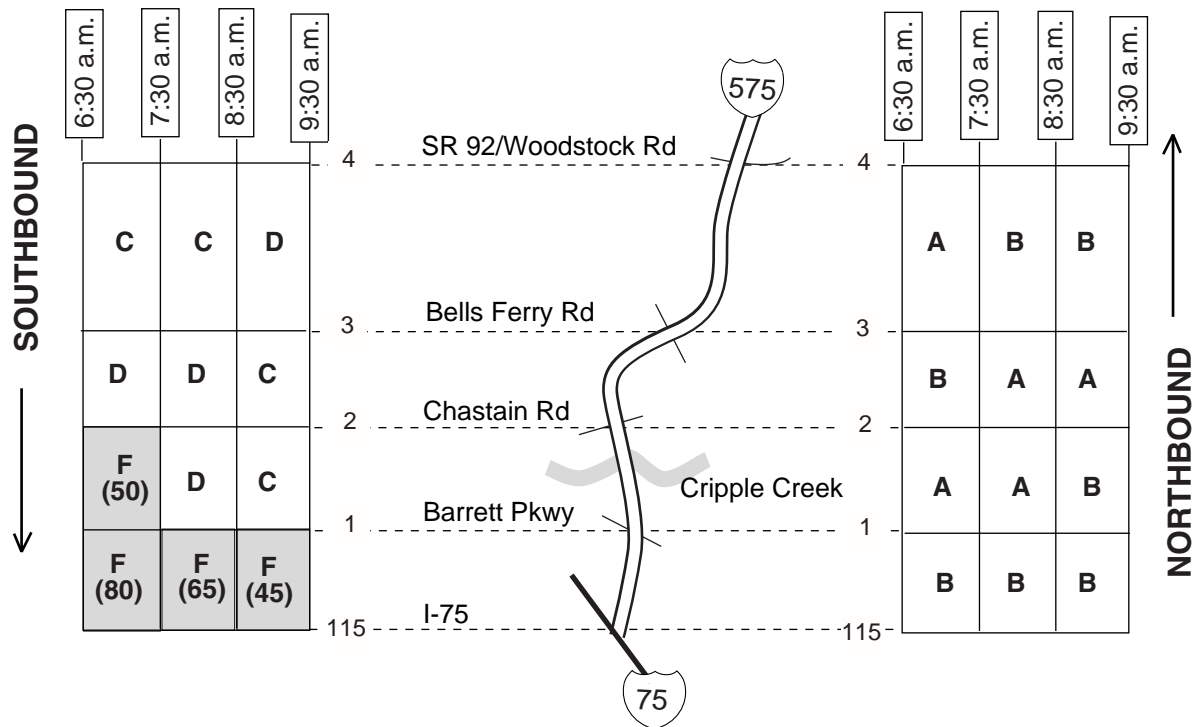
During all observations before 8:00 a.m., moderate to severe congestion was found on I-575 approaching the terminus at I-75; the tail of this queue typically extended back between Barrett Pkwy and Chastain Rd. Estimated average speeds within this queue was typically less than 20 mph. Traffic on the two lane ramp from I-575 typically had to merge into congested southbound flow on I-75. (See photos 152 - 155.JPG)



FREEWAY TRAFFIC QUALITY

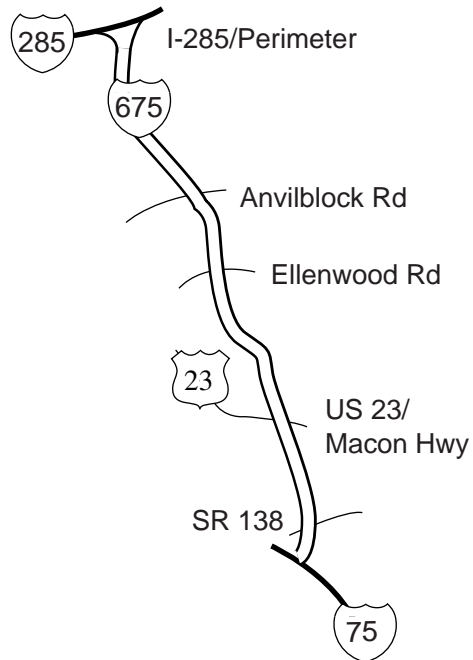
-  Heavy traffic flow or intermittent congestion
-  Congested traffic flow

I-575 MORNING (FALL 1998)



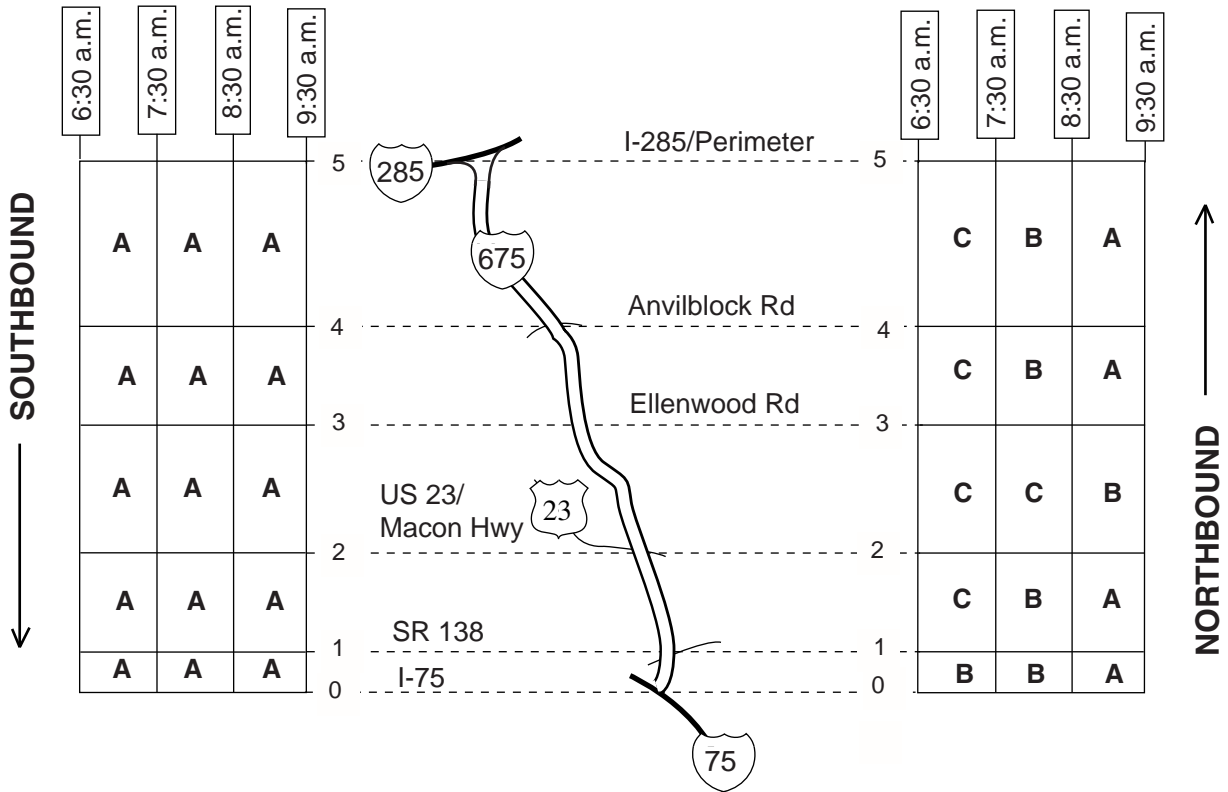


I-675
MORNING (FALL 1998)



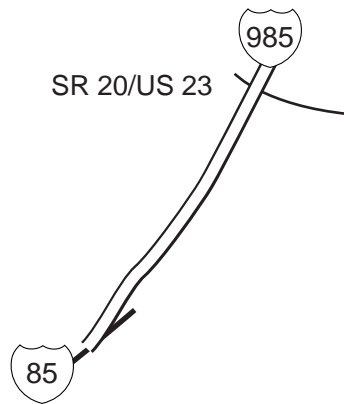
No significant congestion was found on I-675 during the morning survey period.

I-675 MORNING (FALL 1998)



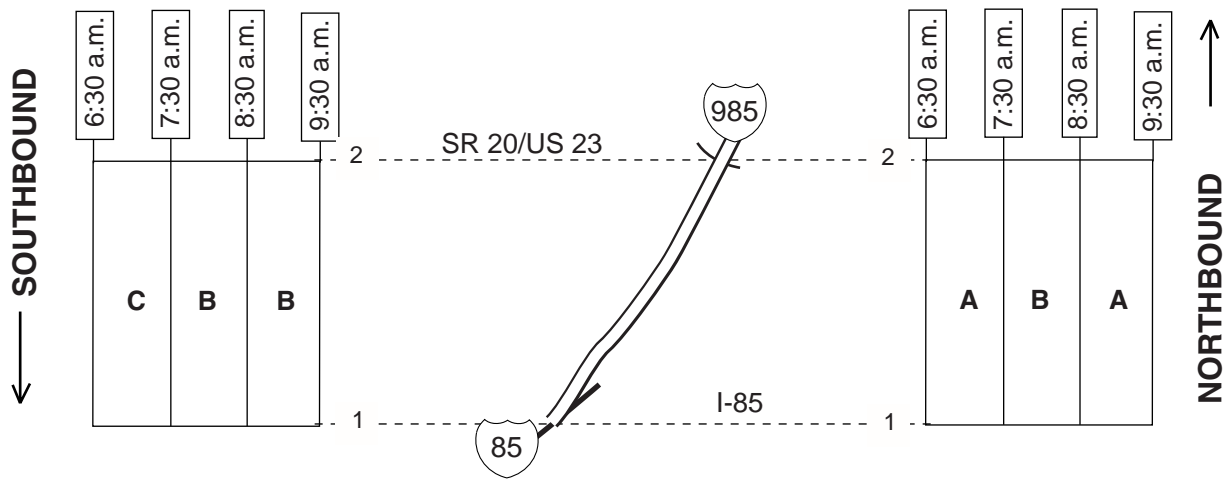


**I-985
MORNING (FALL 1998)**



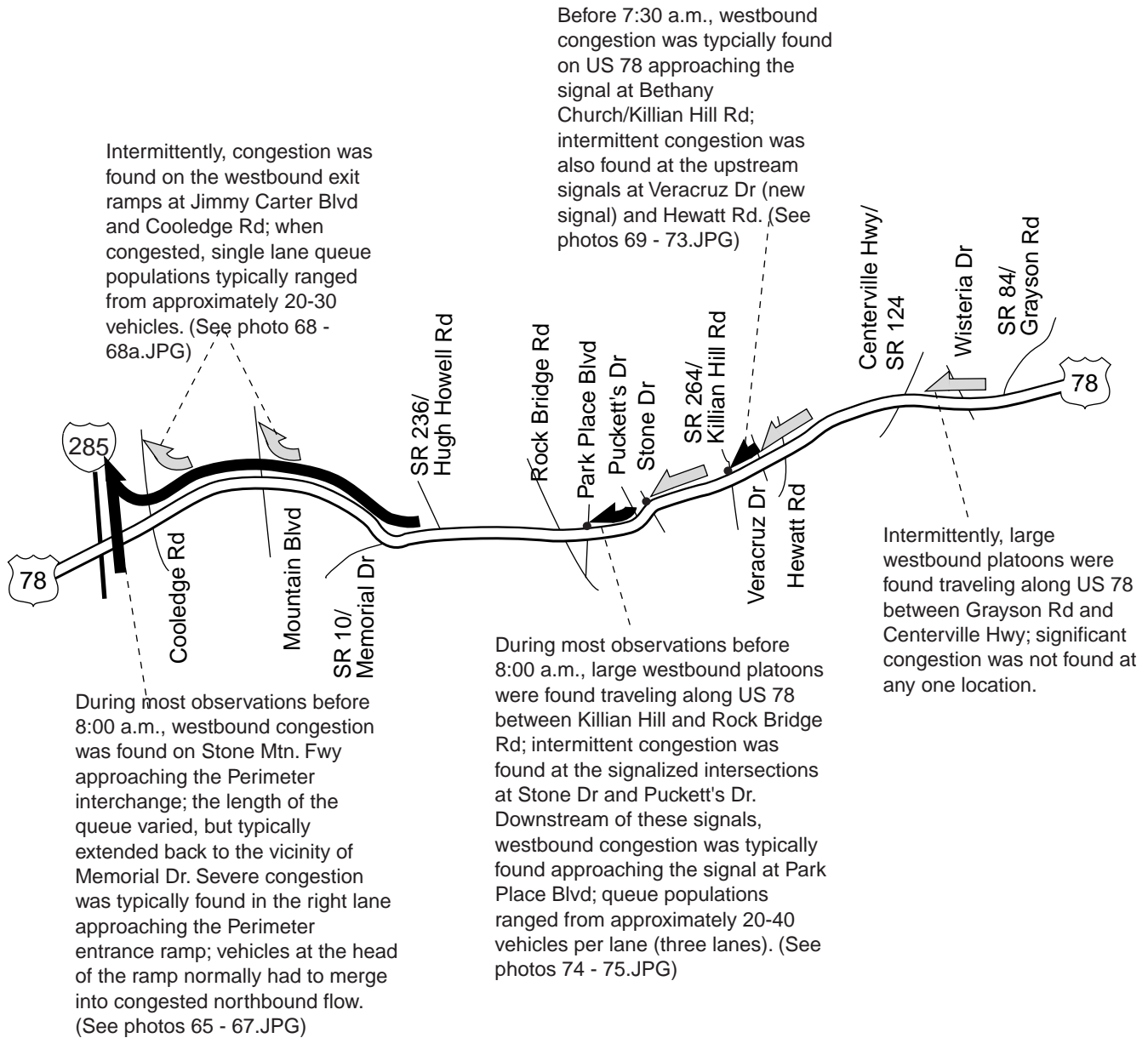
No significant congestion was found on I-675 during the morning survey period.

I-985 MORNING (FALL 1998)





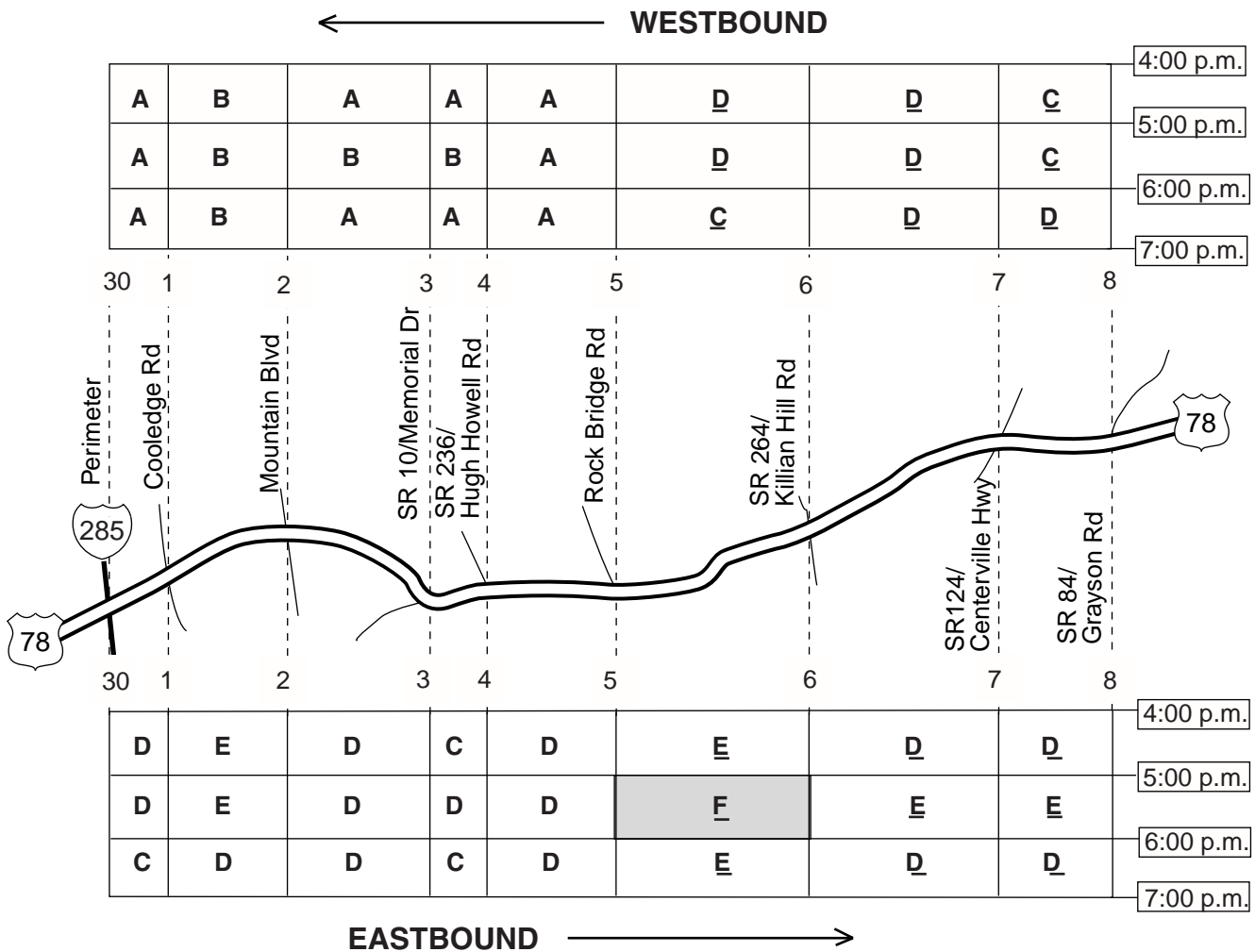
US 78 (STONE MOUNTAIN FWY) MORNING (FALL 1998)



FREEWAY TRAFFIC QUALITY	
	Heavy traffic flow or intermittent congestion
	Congested traffic flow

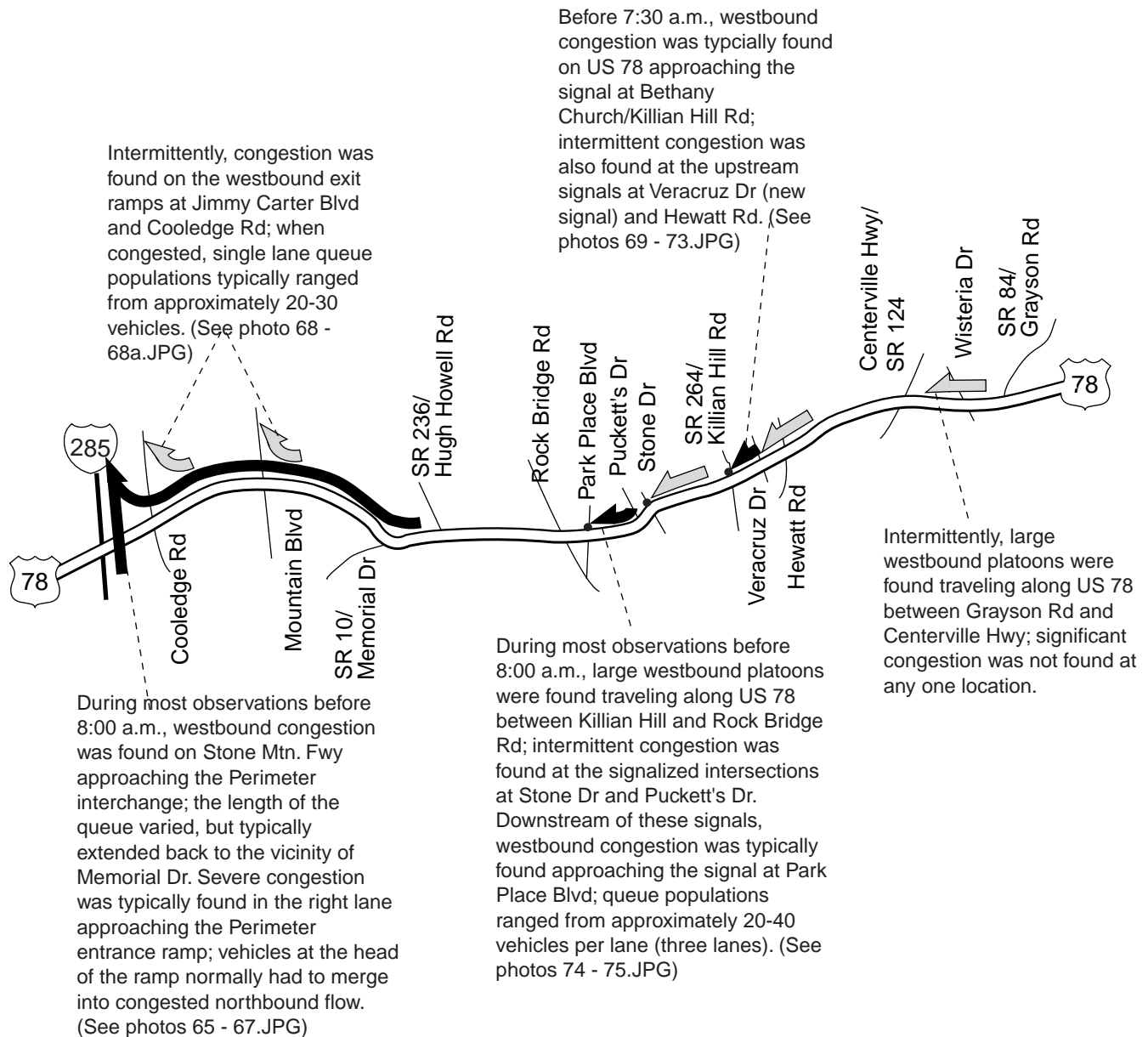
SIGNALIZED HIGHWAY TRAFFIC QUALITY	
	Intermittent congestion or slow moving platoons along a highway segment
	Congested signalized intersection (intermittent)
	Congested signalized intersection (continuous)

US 78 (STONE MOUNTAIN FWY) EVENING (FALL 1998)





US 78 (STONE MOUNTAIN FWY) MORNING (FALL 1998)



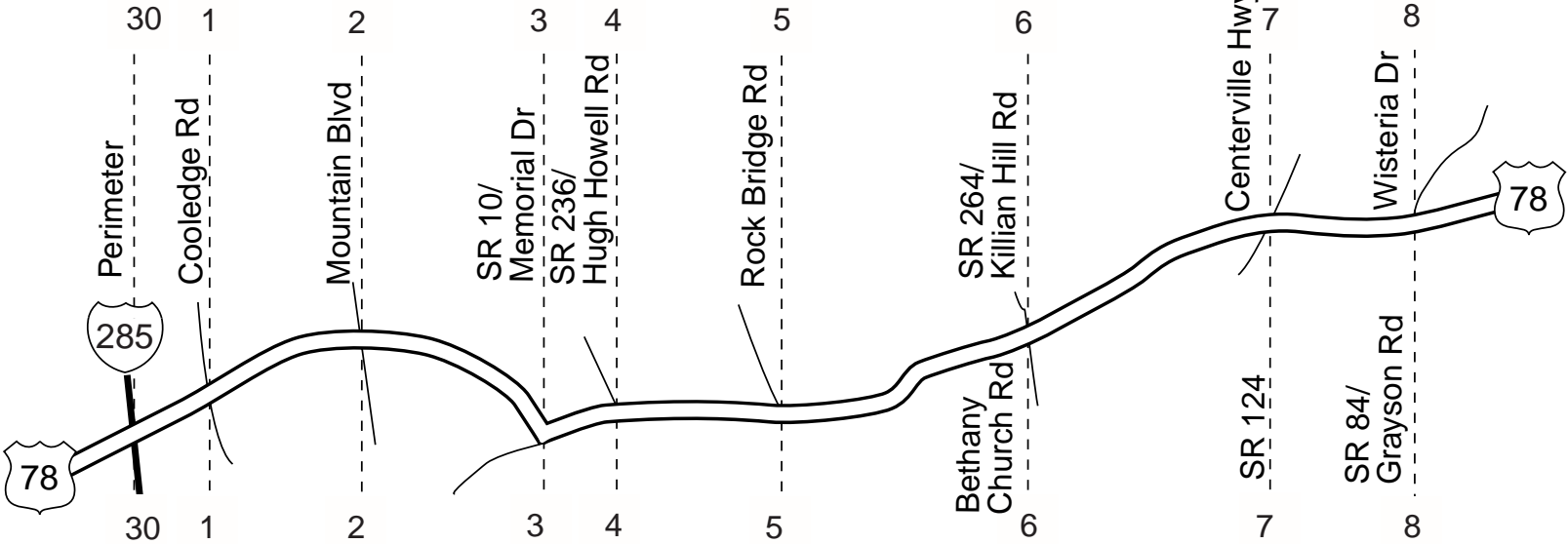
FREEWAY TRAFFIC QUALITY	
	Heavy traffic flow or intermittent congestion
	Congested traffic flow

SIGNALIZED HIGHWAY TRAFFIC QUALITY	
	Intermittent congestion or slow moving platoons along a highway segment
	Congested signalized intersection (intermittent)
	Congested signalized intersection (continuous)

US 78 (STONE MOUNTAIN FWY)
MORNING (FALL 1998)

← WESTBOUND

F (55)	F (45)	F (55)	F (50)	E	E	E	D	6:30 a.m.
D	E	D	C	D	E	D	D	7:30 a.m.
C	C	C	B	C	D	C	C	8:30 a.m.
								9:30 a.m.



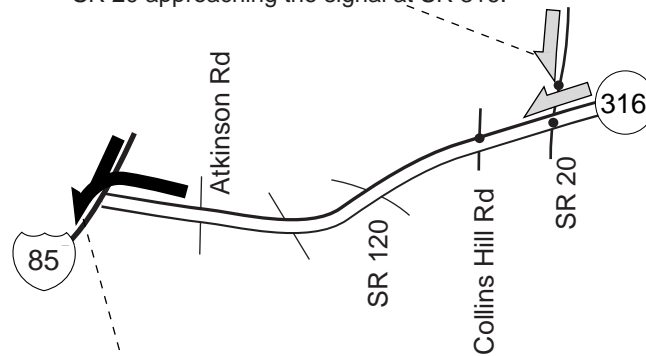
C	B	A	A	A	C	C	C	6:30 a.m.
A	C	A	A	B	D	C	C	7:30 a.m.
B	B	A	A	B	C	C	C	8:30 a.m.
								9:30 a.m.

EASTBOUND →





SR 316 (Gwinnett County) MORNING (FALL 1998)

During most observations before 8:30 a.m., large westbound platoons were found approaching the pair of signals at SR 20 and Collins Hill Rd; traffic in general appeared to clear these signals without experiencing significant delay. Intermittent congestion was also found on southbound SR 20 approaching the signal at SR 316.






During most observations before 8:30 a.m., severe westbound congestion was found on SR 316 approaching the I-85 interchange; the bottleneck was at the merge with congested southbound flow on I-85. The extent of queuing on westbound SR 316 varied widely, but typically did not extend back beyond Atkinson Rd.

FREEWAY TRAFFIC QUALITY

-  Heavy traffic flow or intermittent congestion
-  Congested traffic flow

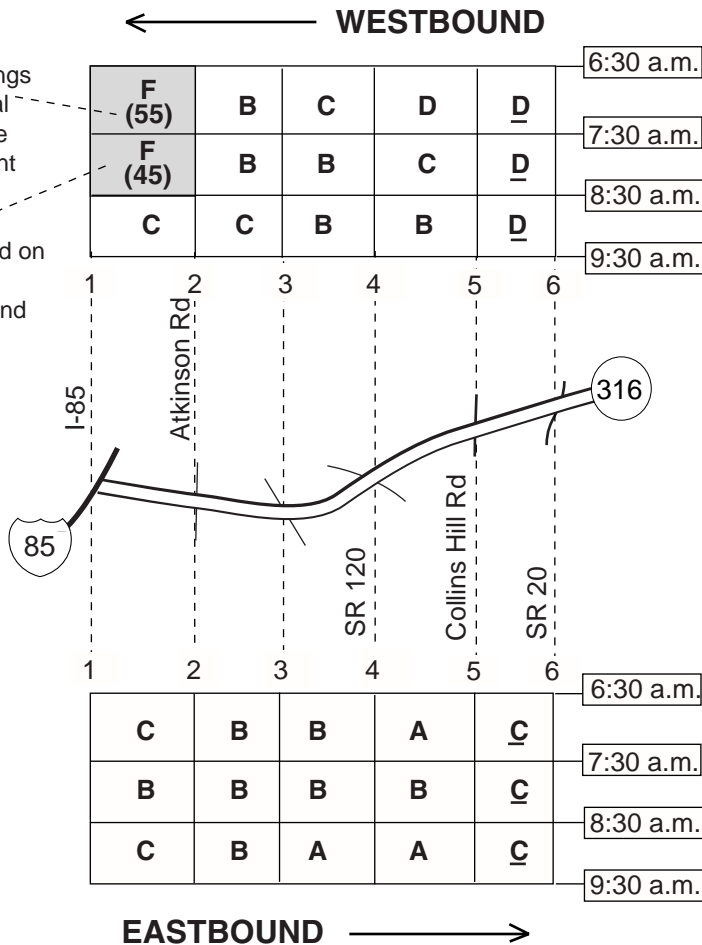
SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

SR 316 (Gwinnett County)

MORNING (FALL 1998)

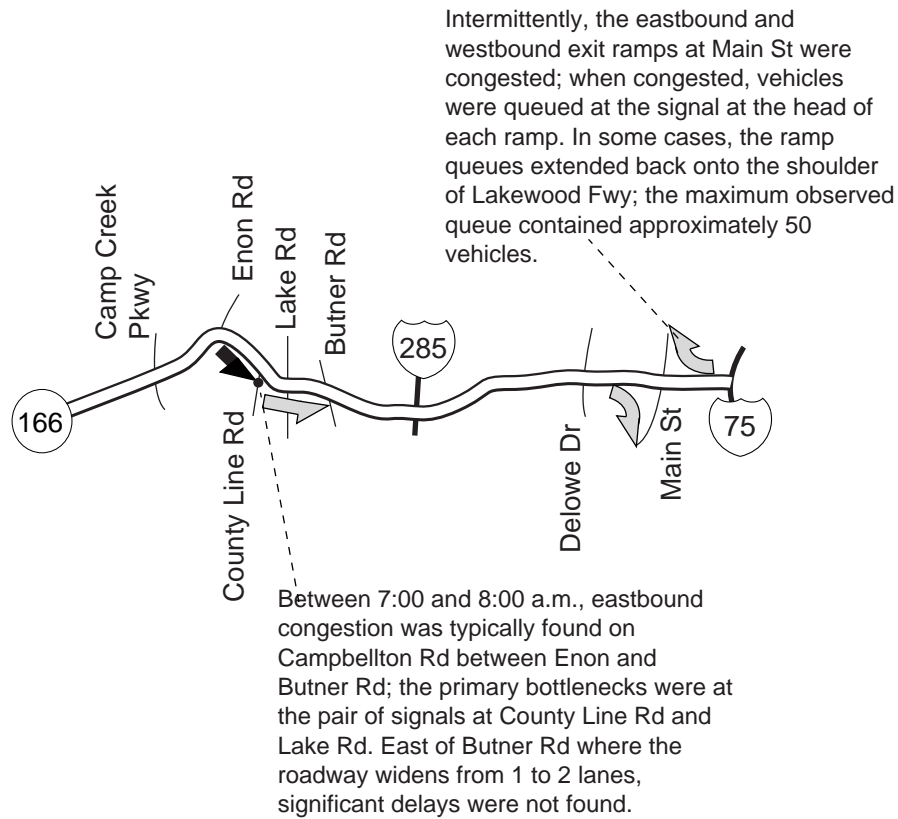
These level-of-service ratings represent the mathematical average of densities for the entire length of the segment from Atkinson Rd to I-85. However, stop-and-go conditions were often found on the approach to the I-85 interchange; the severity and extent of this congestion varied.







CAMPBELLTON RD / LAKEWOOD FWY (SR 166) (Fulton County)




MORNING (FALL 1998)



FREEWAY TRAFFIC QUALITY

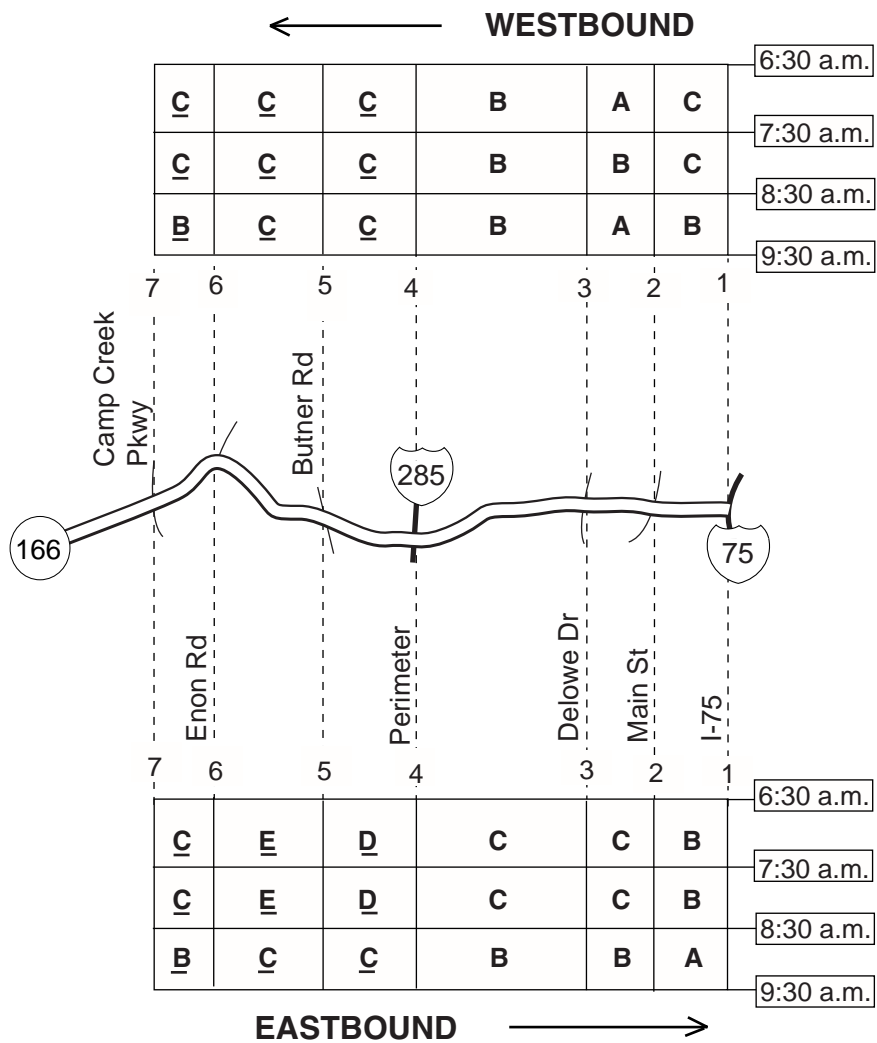
-  Heavy traffic flow or intermittent congestion
-  Congested traffic flow

SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

CAMPBELLTON RD / LAKEWOOD FWY (SR 166) **(Fulton County)**

MORNING (FALL 1998)



PEACHTREE IND. BLVD - PKWY / MEDLOCK BRIDGE RD (SR 141)

(Fulton / Gwinnett / Dekalb Co.)

MORNING (FALL 1998)



Intermittently, northbound congestion was found on Medlock Bridge Rd approaching the signal at McGinnes Ferry Rd; when congested, approximately 20-30 vehicles were queued in the left lane:

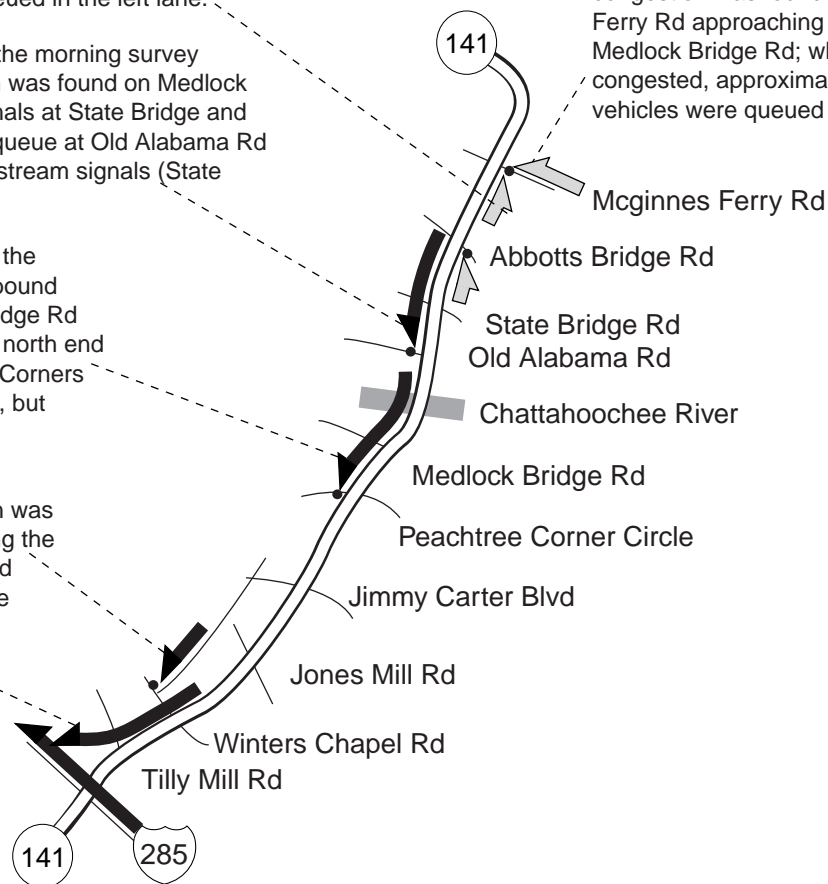
During most observations throughout the morning survey period, severe southbound congestion was found on Medlock Bridge Rd approaching the pair of signals at State Bridge and Old Alabama Rd; in some cases, the queue at Old Alabama Rd extended back through the several upstream signals (State Bridge and Grove Point Rd).

During most observations throughout the morning survey period, severe southbound congestion was found on Medlock Bridge Rd approaching the pair of signals at the north end of Peachtree Pkwy and at Peachtree Corners Circle; the extent of this queue varied, but typically extended back across the Chattahoochee River.

Intermittently, southbound congestion was found on the service road approaching the signal at Tilly Mill Rd; when congested approximately 20-40 vehicles per lane were queued (three lanes).

During most observations before 9:00 a.m., southbound congestion was found on Peachtree Industrial Blvd between the vicinity of Jones Mill Rd and the Perimeter. This congestion was caused by merging traffic from Tilly Mill Rd and weaving approaching the one-lane exit ramp to the Perimeter (westbound).

Intermittently, westbound congestion was found on McGinnes Ferry Rd approaching the signal at Medlock Bridge Rd; when congested, approximately 30-40 vehicles were queued (one lane).



SIGNALIZED HIGHWAY TRAFFIC QUALITY

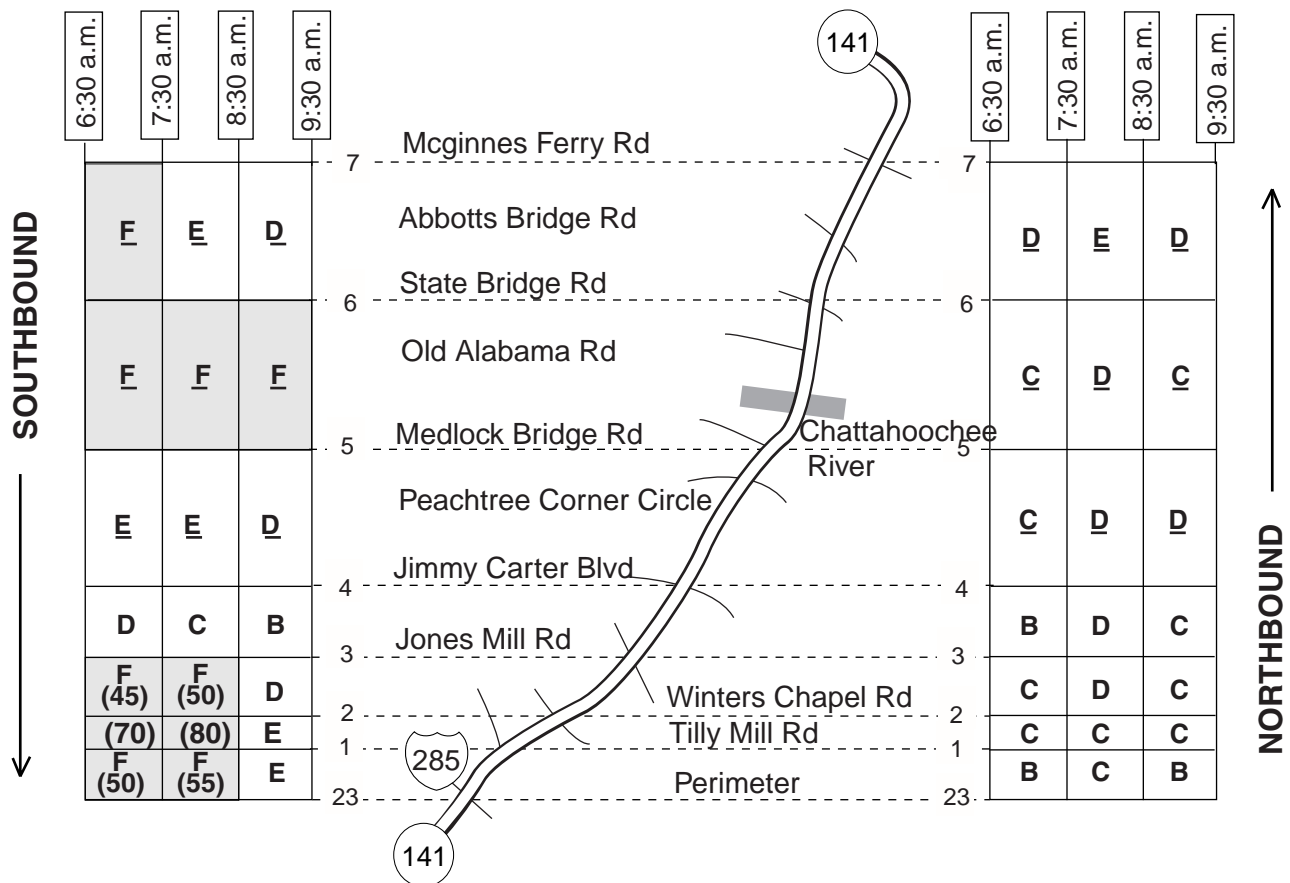
- Intermittent congestion or slow moving platoons along a highway segment
- Congested signalized intersection (intermittent)
- Congested signalized intersection (continuous)

FREEWAY TRAFFIC QUALITY

- Heavy traffic flow or intermittent congestion
- Congested traffic flow

PEACHTREE IND. BLVD - PKWY / MEDLOCK BRIDGE RD (SR 141)
(Fulton / Gwinnett / Dekalb Co.)

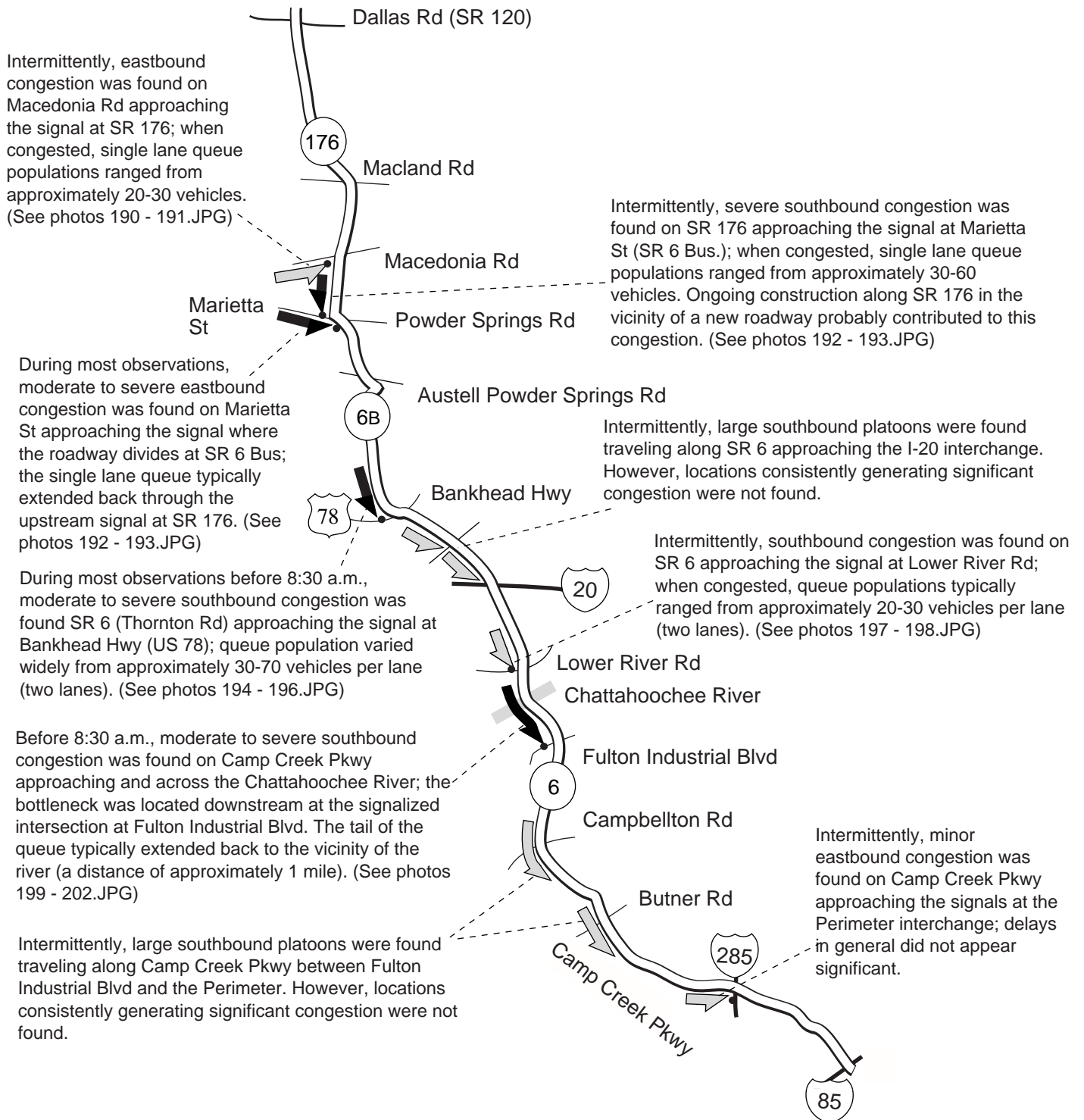
MORNING (FALL 1998)





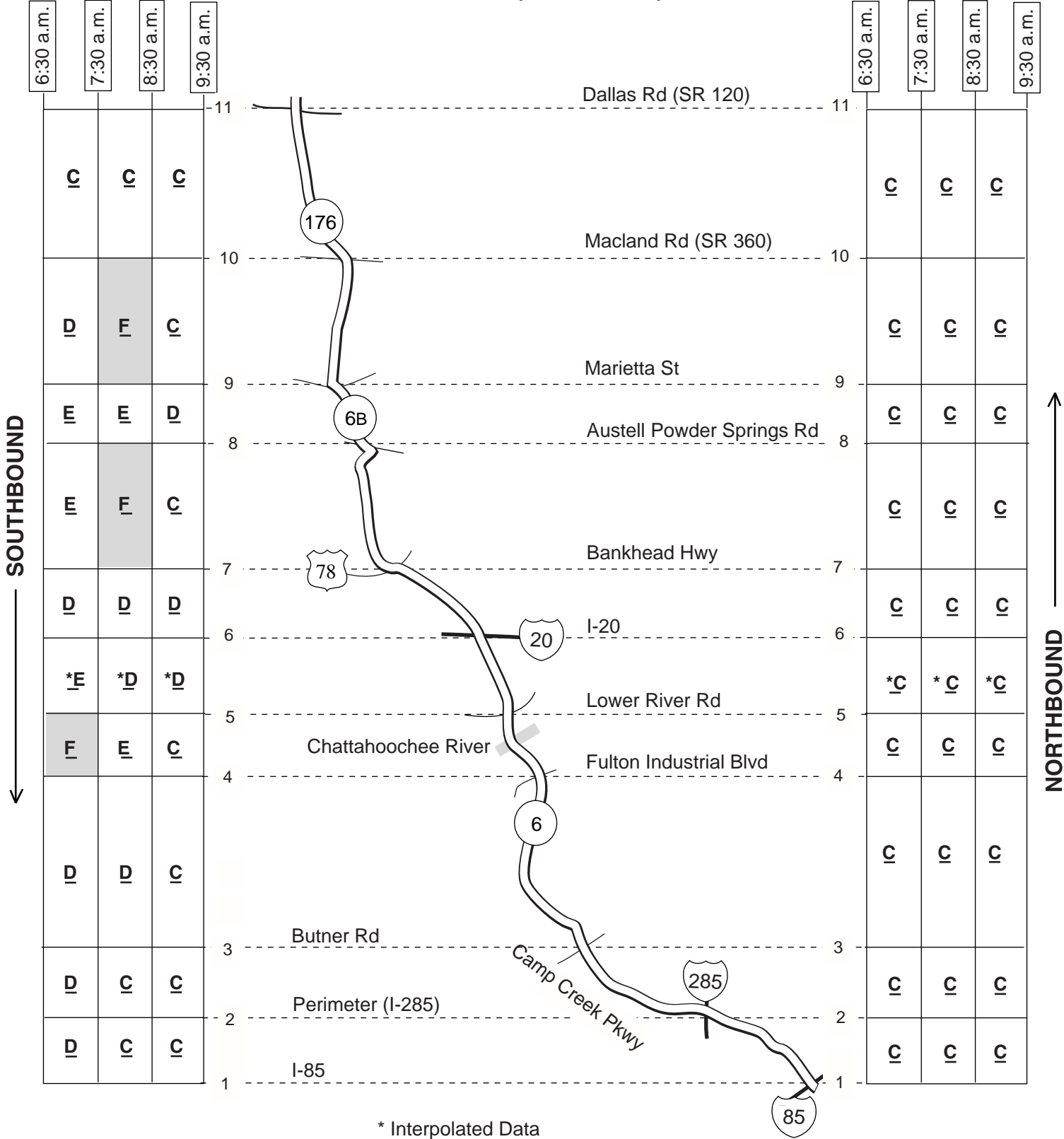
SR 176 / SR 6 / CAMP CREEK PKWY (Cobb / Douglas / Fulton Co.)

MORNING (FALL 1998)



SR 176 / SR 6 / CAMP CREEK PKWY **(Cobb / Douglas / Fulton Co.)**

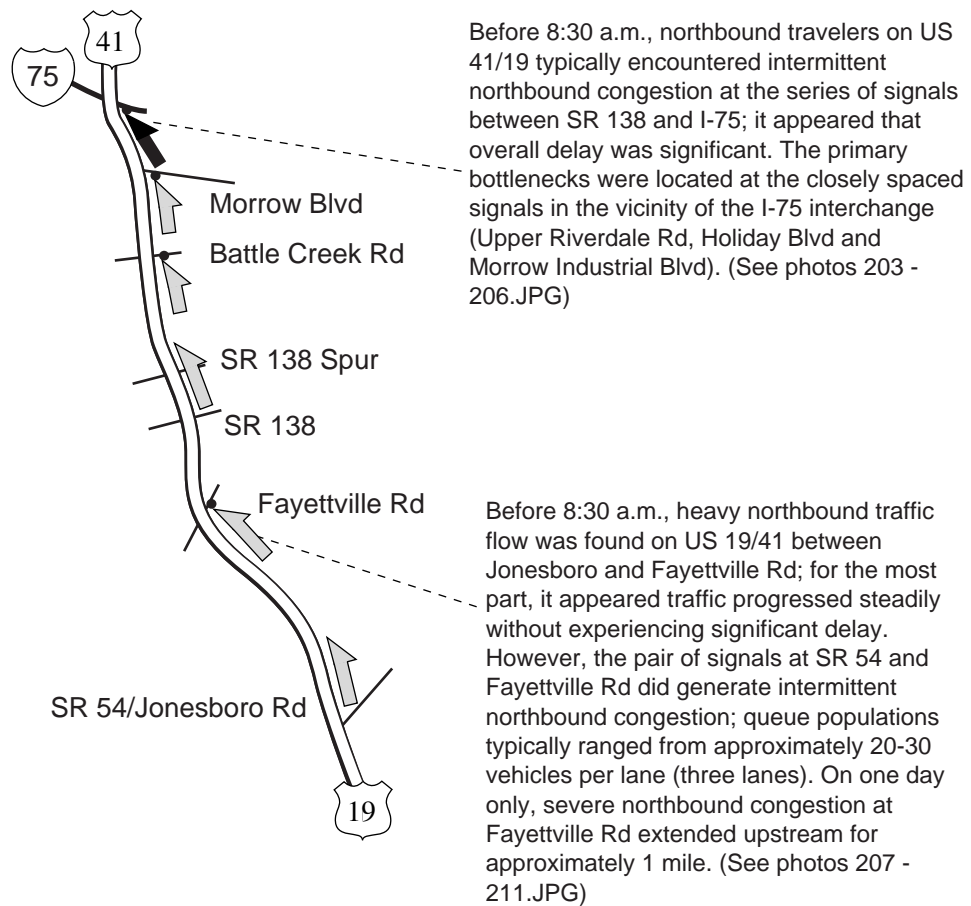
MORNING (FALL 1998)








US 41 / 19 (TARA BLVD) (Clayton County)

MORNING (FALL 1998)

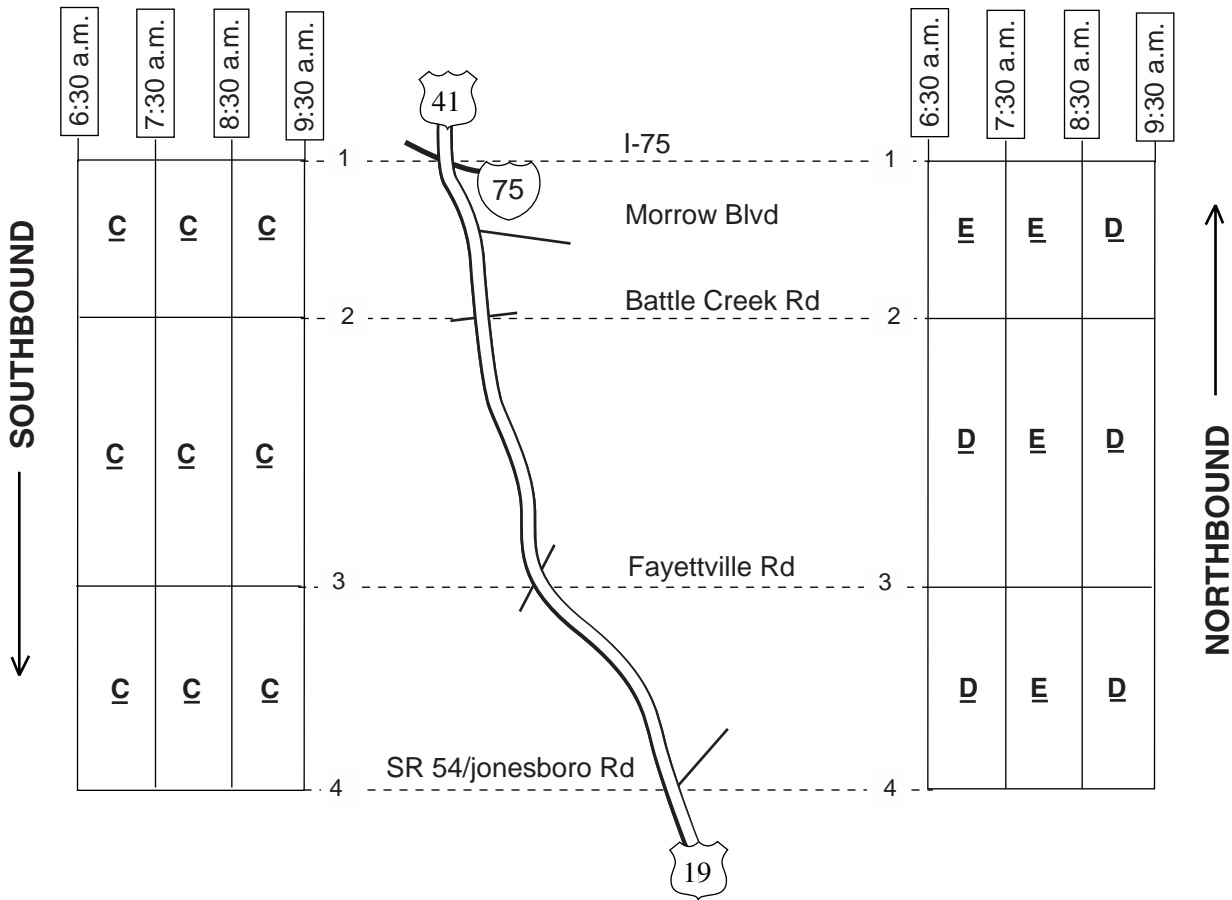


SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

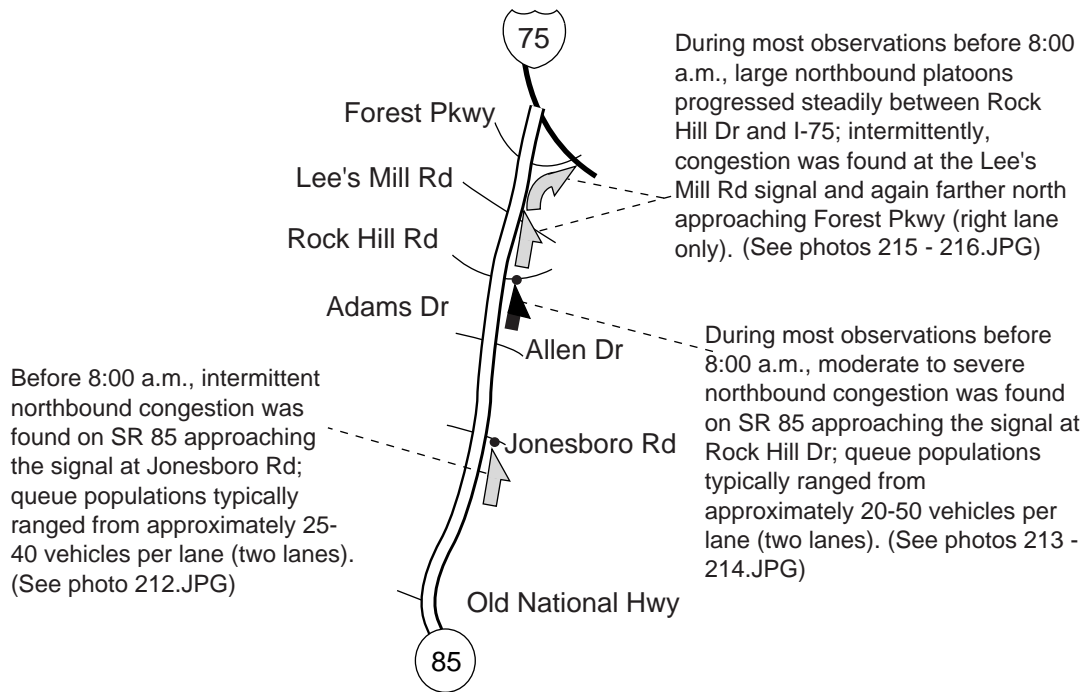
US 41 / 19 (TARA BLVD)
(Clayton County.)

MORNING (FALL 1998)








**SR 85
(Clayton County)
MORNING (FALL 1998)**

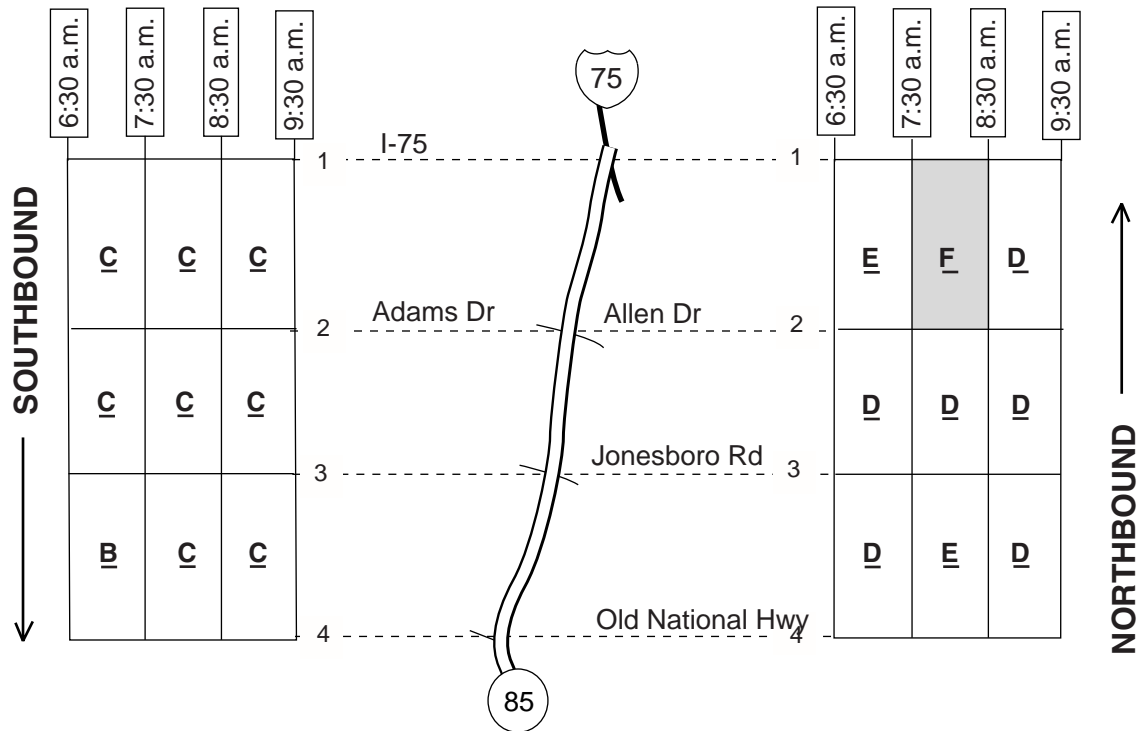


SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

SR 85 (Clayton County)

MORNING (FALL 1998)





ALPHARETTA / STATE BRIDGE / PLEASANT HILL RD (SR 120) (Fulton / Gwinnett Co.)

MORNING (FALL 1998)

During most observations after 7:30 a.m., severe westbound congestion was found on State Bridge Rd approaching the signal at the merge with State Bridge / Kimball Way; in several cases, this queue extended all the way back to Jones Bridge Rd. This congestion was exacerbated by ongoing construction in this vicinity.

During most observations, severe southbound congestion was found on Medlock Bridge Rd approaching the signal at State Bridge Rd; in some cases, the queue extended back through several upstream signals. Severe southbound congestion persisted downstream of State Bridge Rd approaching the signal at Old Alabama Rd.

During most observations between 7:30 an 9:00 a.m., moderate to severe congestion was found in each direction on Pleasant Hill Rd approaching the signal at Buford Hwy. In addition to the signal, the intermittent blockage of the roadway at the train tracks (Norfolk Southern Railway) contributed to the severity of this congestion. Vehicles were intermittently queued at the signal (Buford Hwy) and the train tracks. Extensive delays were typically encountered by vehicles at this location (particularly northbound vehicles).

Intermittently, moderate to severe westbound congestion was found on State Bridge Rd approaching the signal at Eastside Dr; when congested, the left lane queue was extensive. The maximum observed queue in the left lane contained approximately 75 vehicles.

During most observations between 7:30 and 8:30 a.m., moderate to severe eastbound congestion was found on State Bridge Rd approaching the signals where the roadway divides at State Bridge / Kimball Way; this congestion was exacerbated by a lane drop (2 lanes to 1) and ongoing construction in this vicinity.

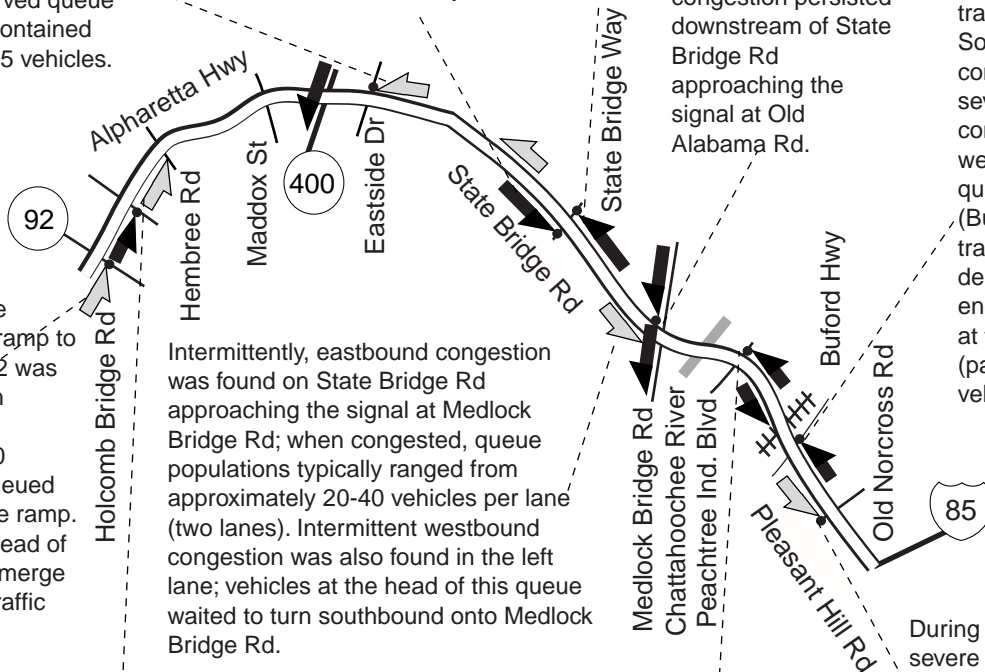
Intermittently, the northbound exit ramp to eastbound SR 92 was congested; when congested approximately 20 vehicles were queued at the head of the ramp. Vehicles at the head of the ramp had to merge into eastbound traffic flow on SR 92.

Intermittently, eastbound congestion was found on State Bridge Rd approaching the signal at Medlock Bridge Rd; when congested, queue populations typically ranged from approximately 20-40 vehicles per lane (two lanes). Intermittent westbound congestion was also found in the left lane; vehicles at the head of this queue waited to turn southbound onto Medlock Bridge Rd.

During most observations after 7:30 p.m., eastbound congestion was found on Alpharetta Hwy approaching the signal at Mansell Rd; queue populations typically ranged from approximately 20-40 vehicles per lane (two lanes).

Before 8:30 a.m., moderate to severe westbound congestion was found on Pleasant Hill Rd approaching the signal at Peachtree Industrial Blvd; in some cases, the queue extended back through the upstream signal at Howell Ferry Rd (a distance of approximately 1/2 mile).

During most observations, severe southbound congestion was found on Medlock Bridge Rd approaching the signal at State Bridge Rd; in some cases, the queue extended back through several upstream signals. Severe southbound congestion persisted downstream of State Bridge Rd approaching the signal at Old Alabama Rd.

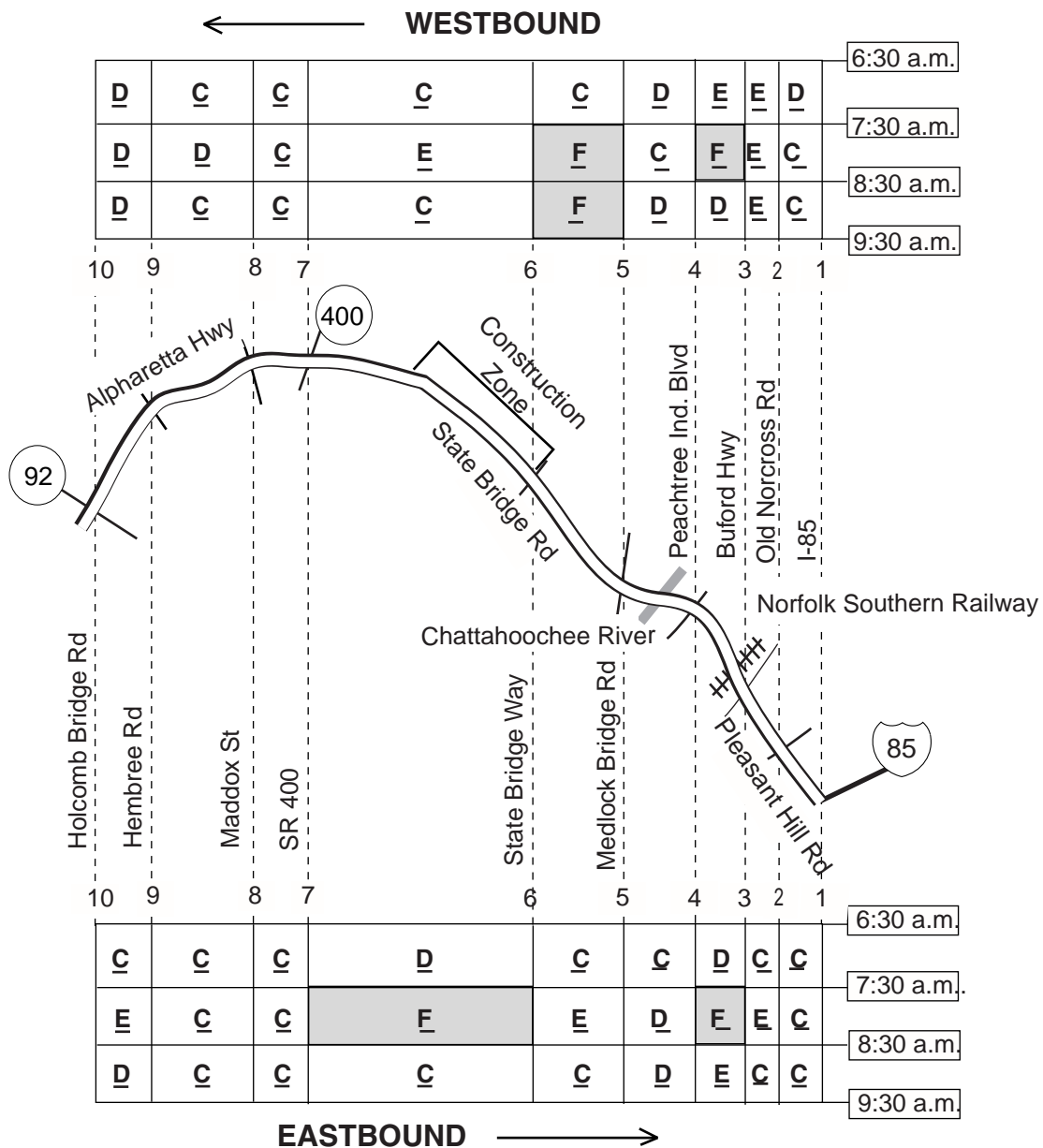


SIGNALIZED HIGHWAY TRAFFIC QUALITY

- Intermittent congestion or slow moving platoons along a highway segment
- Congested signalized intersection (intermittent)
- Congested signalized intersection (continuous)

ALPHARETTA / STATE BRIDGE / PLEASANT HILL RD (SR 120) (Fulton / Gwinnett Co.)

MORNING (FALL 1998)

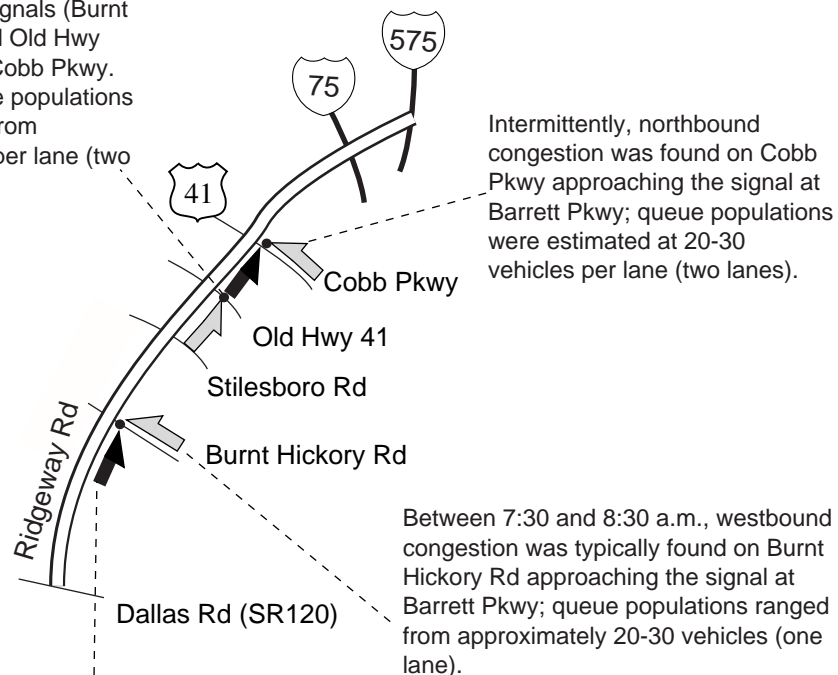




RIDGEWAY RD / BARRETT PKWY (Cobb County)




MORNING (FALL 1998)

During most observations before 8:00 a.m., northbound congestion was found on Barrett Pkwy at the series of signals (Burnt Hickory Rd, Stilesboro Rd, and Old Hwy 41) between Dallas Hwy and Cobb Pkwy. When congested, signal queue populations at these intersections ranged from approximately 20-50 vehicles per lane (two lanes). (See photos 238 - 242)



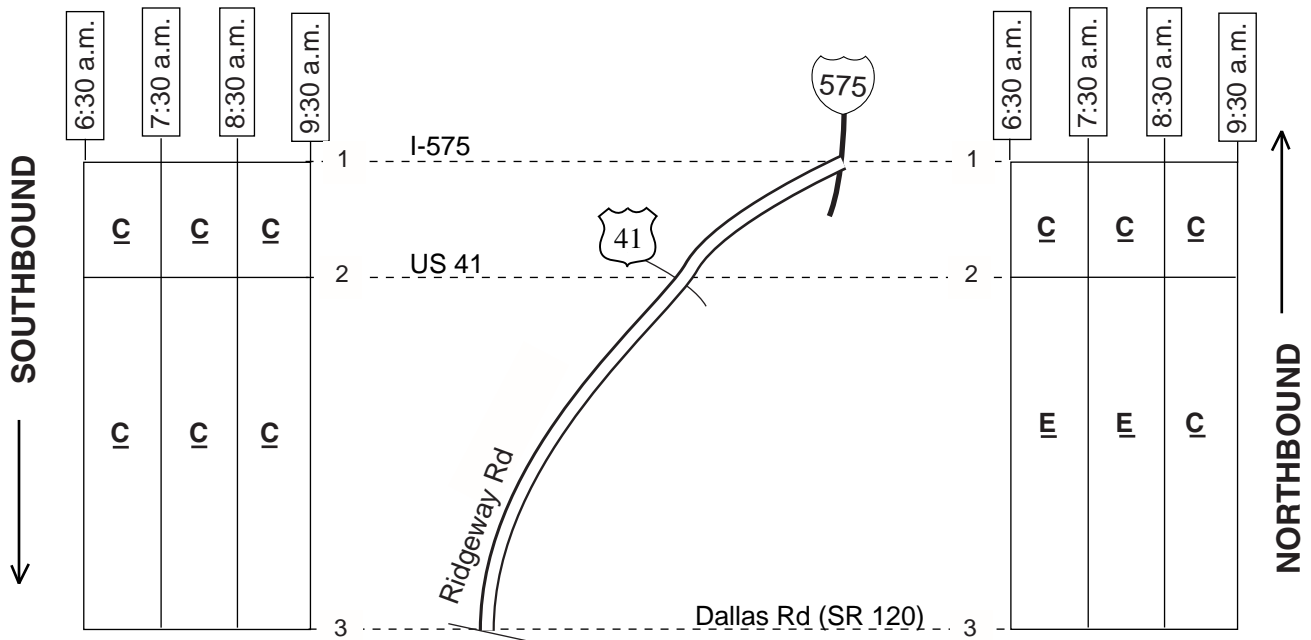
During most observations before 8:00 a.m., northbound congestion was found on Barrett Pkwy at the series of signals (Burnt Hickory Rd, Stilesboro Rd, and Old Hwy 41) between Dallas Hwy and Cobb Pkwy. When congested, signal queue populations at these intersections ranged from approximately 20-50 vehicles per lane (two lanes). (See photos 238 - 242)

SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

RIDGEWAY RD / BARRETT PKWY (Cobb County)

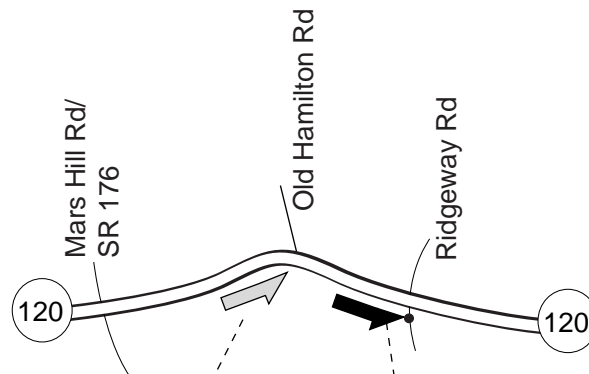
MORNING (FALL 1998)





DALLAS RD (SR 120) (Cobb County)




MORNING (FALL 1998)



Intermittently, large eastbound platoons were found traveling along Dallas Rd between Midway and Old Hamilton Rd. However, locations consistently generating significant congestion were not found.

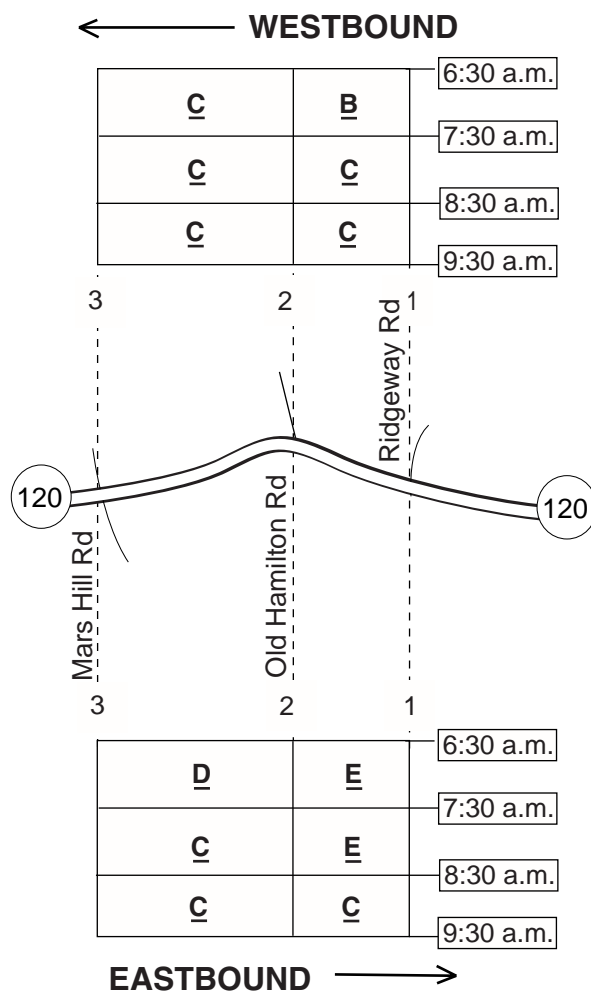
During most observations before 8:30 a.m., moderate to severe eastbound congestion was found on Dallas Rd approaching the signal at Ridgeway Rd; at its maximum observed extent, the queue population exceeded 75 vehicles per lane (two lanes). Intermittently, extensive queuing was found in the left lane where vehicles waited to turn northbound on Ridgeway Rd. (See photos 243 - 245)

SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

DALLAS RD (SR 120) (COBB COUNTY)

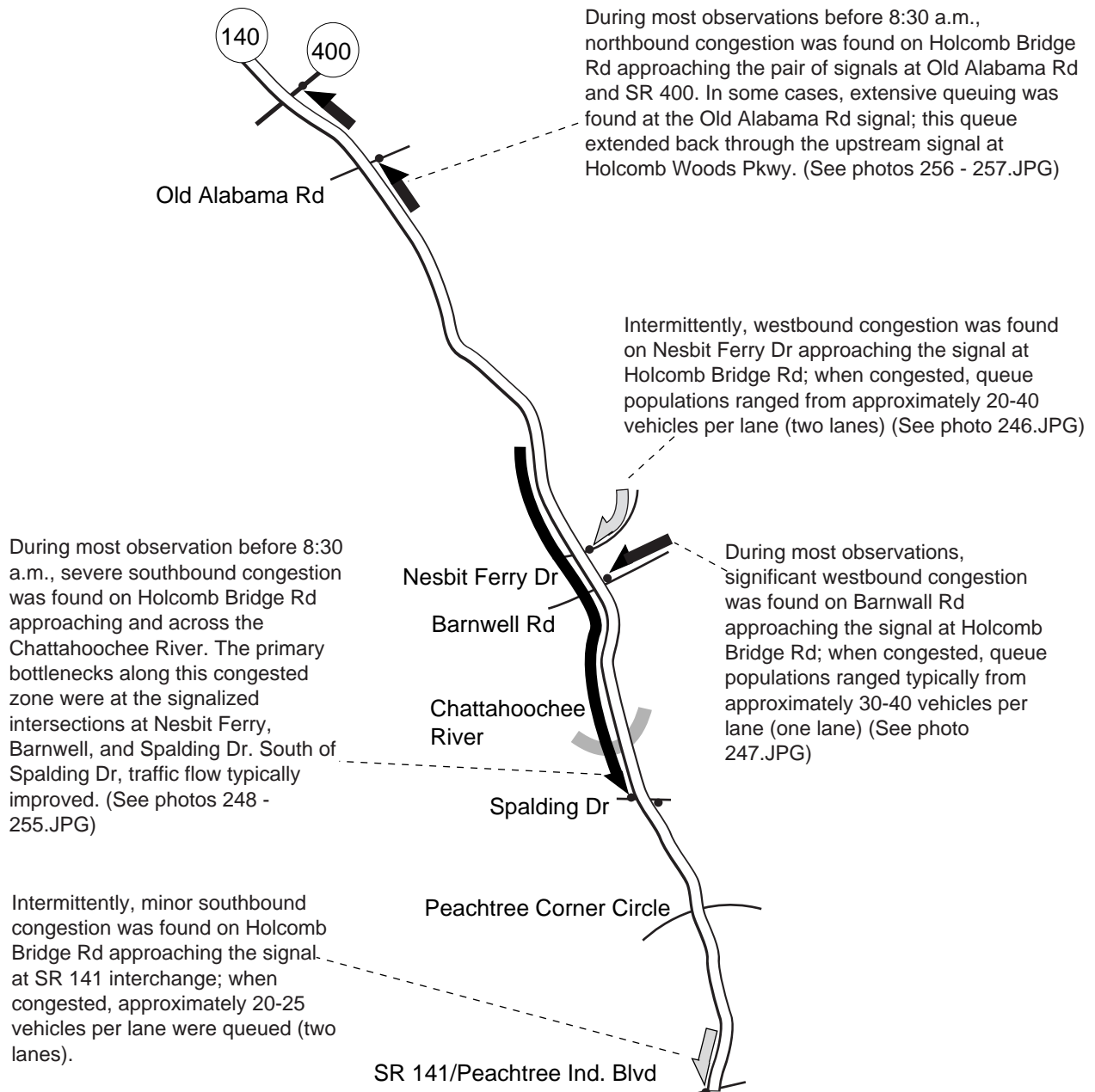
MORNING (FALL 1999)








HOLCOMB BRIDGE RD (SR 140) (Gwinnett / Fulton Co.)

MORNING (FALL 1998)

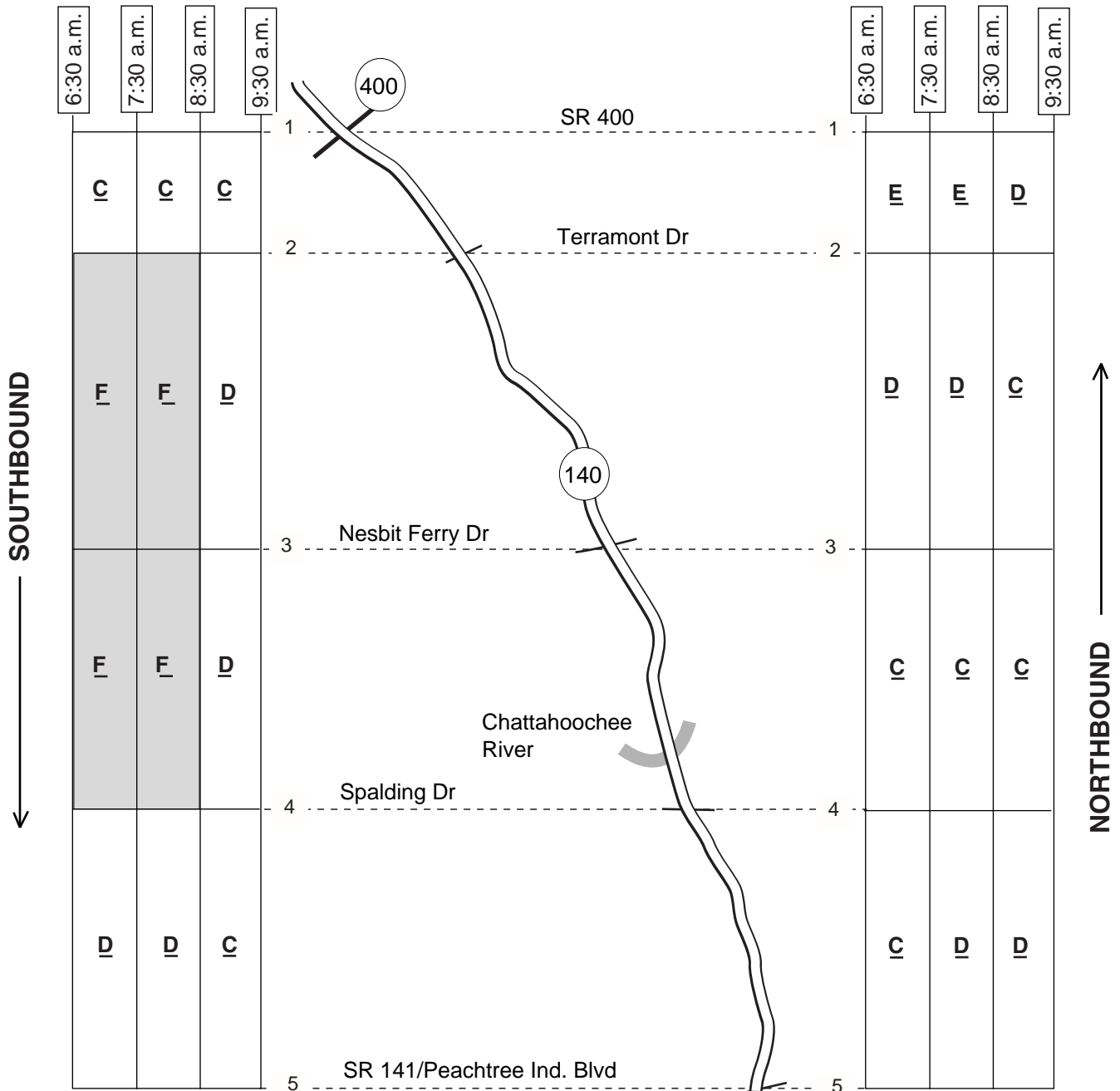


SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

HOLCOMB BRIDGE RD (SR 140) (Gwinnett / Fulton Co.)

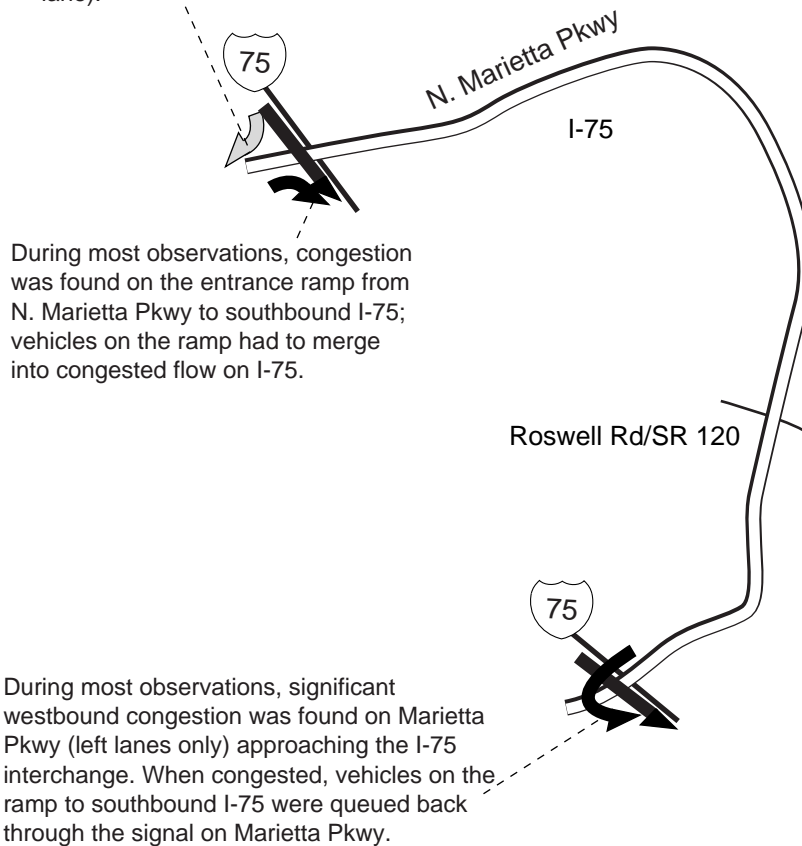
MORNING (FALL 1998)





MARIETTA PKWY (Cobb County) MORNING (FALL 1998)




During most observations before 8:00 a.m., the southbound exit ramp at N. Marietta Pkwy was congested; single lane queue populations were estimated at approximately 20-25 vehicles (left lane).



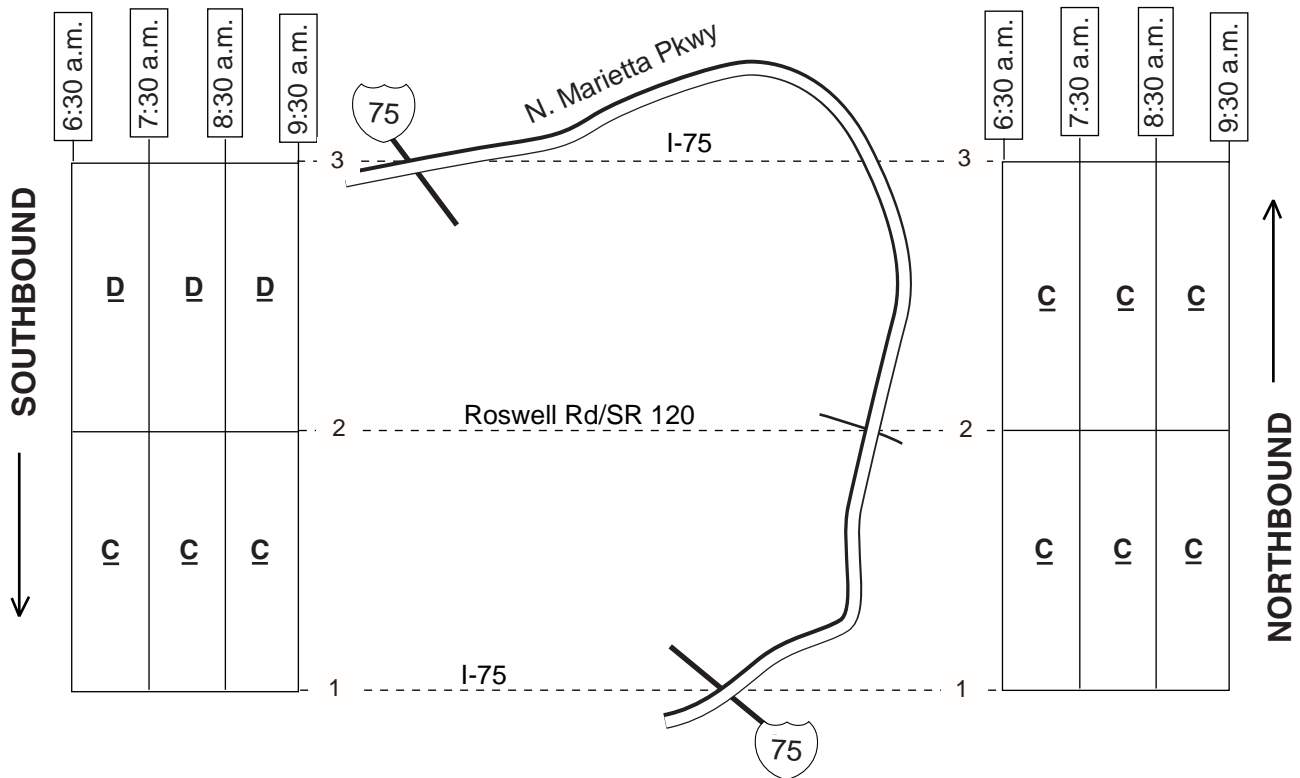
During most observations, congestion was found on the entrance ramp from N. Marietta Pkwy to southbound I-75; vehicles on the ramp had to merge into congested flow on I-75.

During most observations, significant westbound congestion was found on Marietta Pkwy (left lanes only) approaching the I-75 interchange. When congested, vehicles on the ramp to southbound I-75 were queued back through the signal on Marietta Pkwy.

SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

**MARIETTA PKWY
(Cobb County)
MORNING (FALL 1998)**



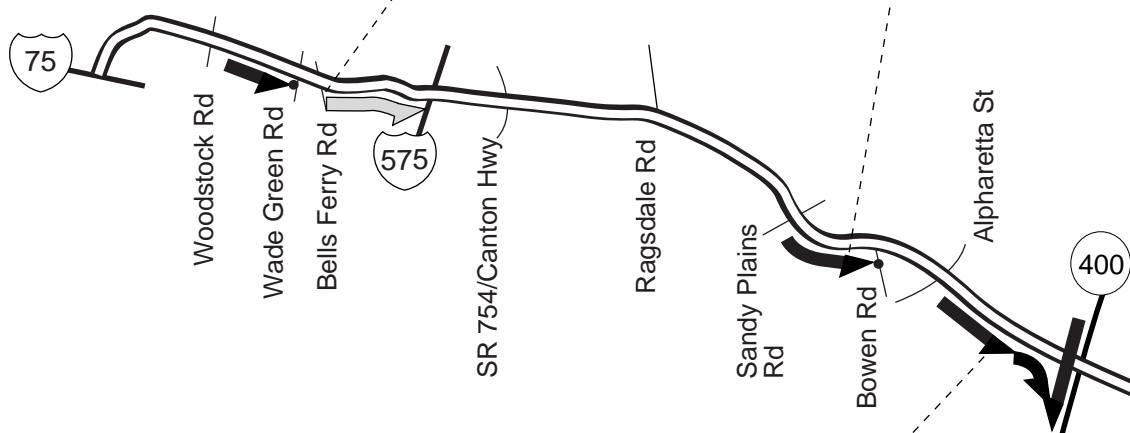


SR 92 (CROSSVILLE / WOODSTOCK /ALABAMA RD) (Cherokee / Fulton Co.)

MORNING (FALL 1998)




During most observations, moderate to severe eastbound congestion was found on SR 92 approaching the signal at Wade Green Rd; queue populations ranged widely between approximately 20 and 75 vehicles (one lane). East of Wade Green Rd, large platoons appeared to progress steadily up to where the roadway widens from 1 to 2 lanes (vicinity of the I-575 interchange). (See photos 258 - 260.JPG)

During most observations before 8:30 a.m., severe eastbound congestion was found on SR 92 approaching the signal at Bowen Rd; extensive queues (1-2 miles in length) often extended back to the vicinity of Sandy Plains Rd. (See photos 264 - 269.JPG)



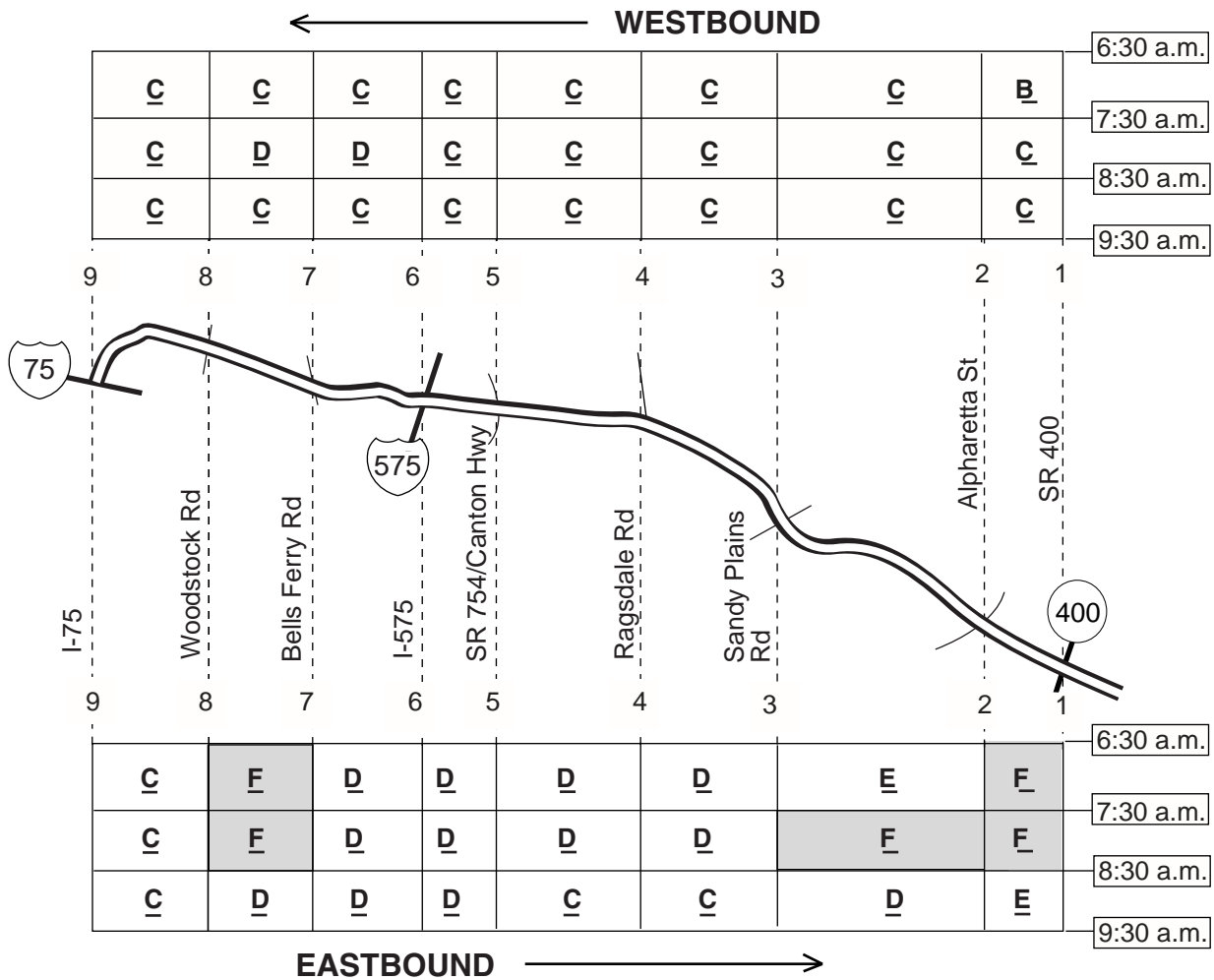
During most observations before 9:00 a.m., severe eastbound congestion was found on SR 92 approaching the SR 400 interchange; extensive queues (1-2 miles in length) often extended back through several upstream signals. At times, the head of the queue was located downstream on the entrance ramp to southbound SR 400. (See 261 - 263.JPG)

SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

**SR 92 (CROSSVILLE / WOODSTOCK /ALABAMA RD)
(Cherokee / Fulton Co.)**

MORNING (FALL 1998)

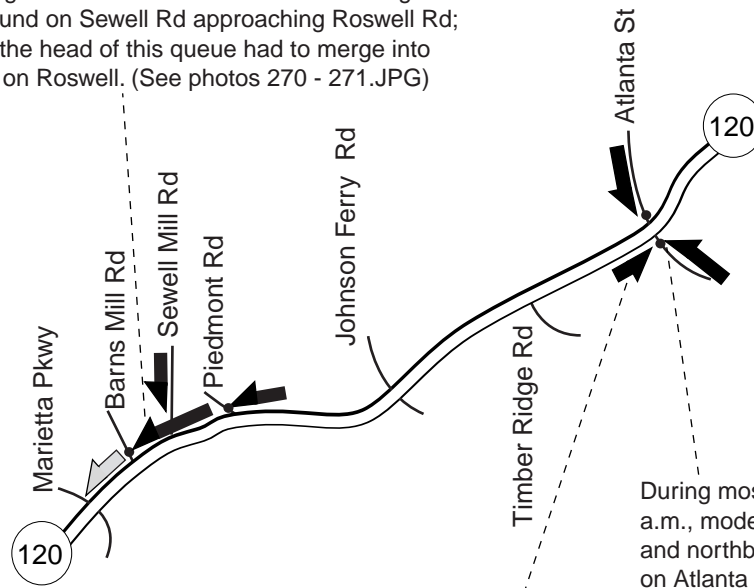




ROSWELL RD (SR 120) (Cobb County)

MORNING (FALL 1998)




During most observations before 8:30 a.m., westbound congestion was found on Roswell Rd approaching the pair of signals at Sewell Mill and Barnes Mill Rd; in several cases, extensive queuing extended back through the upstream signal at Piedmont Rd. Westbound congestion was also found on Sewell Rd approaching Roswell Rd; vehicles at the head of this queue had to merge into congestion on Roswell. (See photos 270 - 271.JPG)



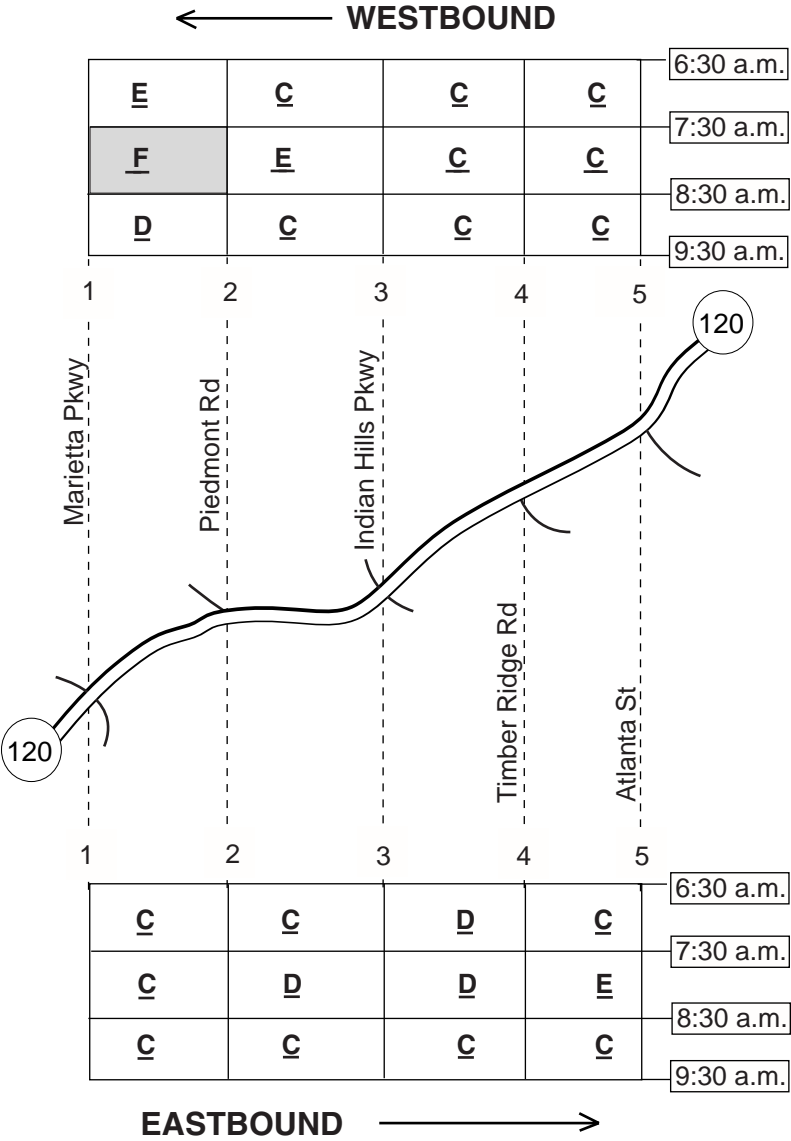
During all observations between 7:30 and 8:30 a.m., eastbound congestion was found on Roswell Rd approaching the signal at Atlanta St; queue populations typically ranged from approximately 30-40 vehicles per lane (two left lanes). (See photos 273 - 274.JPG)

During most observations before 8:30 a.m., moderate to severe southbound and northbound congestion was found on Atlanta St approaching the signal at Roswell Rd; these single lane queues appeared to cause extensive delays for travelers on Atlanta St. (See photo 272.JPG)

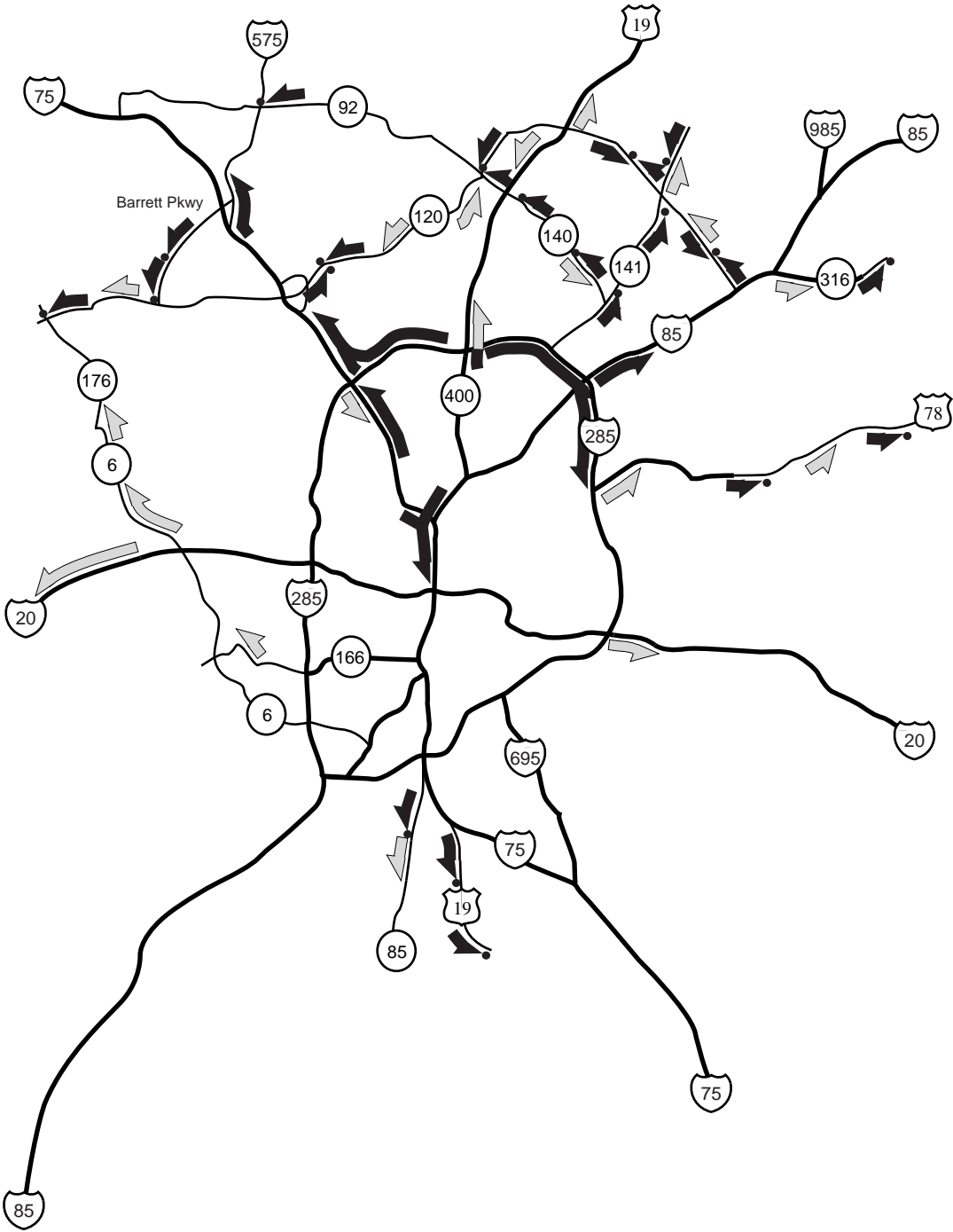
SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)




ROSWELL RD (SR 120) (Cobb County) MORNING (FALL 1998)





LOCATIONS WHERE CONGESTION WAS FOUND IN THE ATLANTA METROPOLITAN AREA



SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

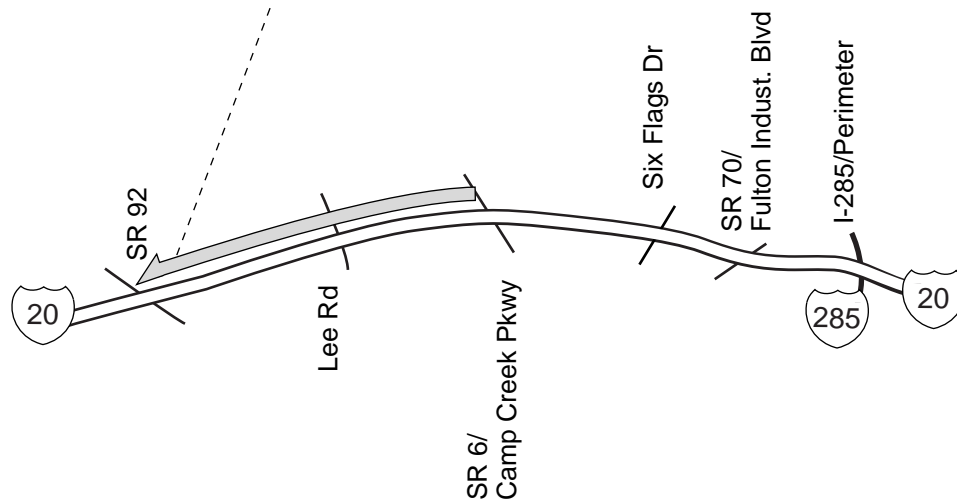
FREEWAY TRAFFIC QUALITY

-  Heavy traffic flow or intermittent congestion
-  Congested traffic flow



I-20 (WEST OF PERIMETER) EVENING (FALL 1998)



During most observations between 5:30 and 6:30 p.m., heavy westbound traffic flow was found on I-20 between Camp Creek Pkwy and SR 92 (estimated speeds approx. 50 mph). The lane drop (4 lanes to 3) west of Camp Creek Pkwy contributed to this slowing.

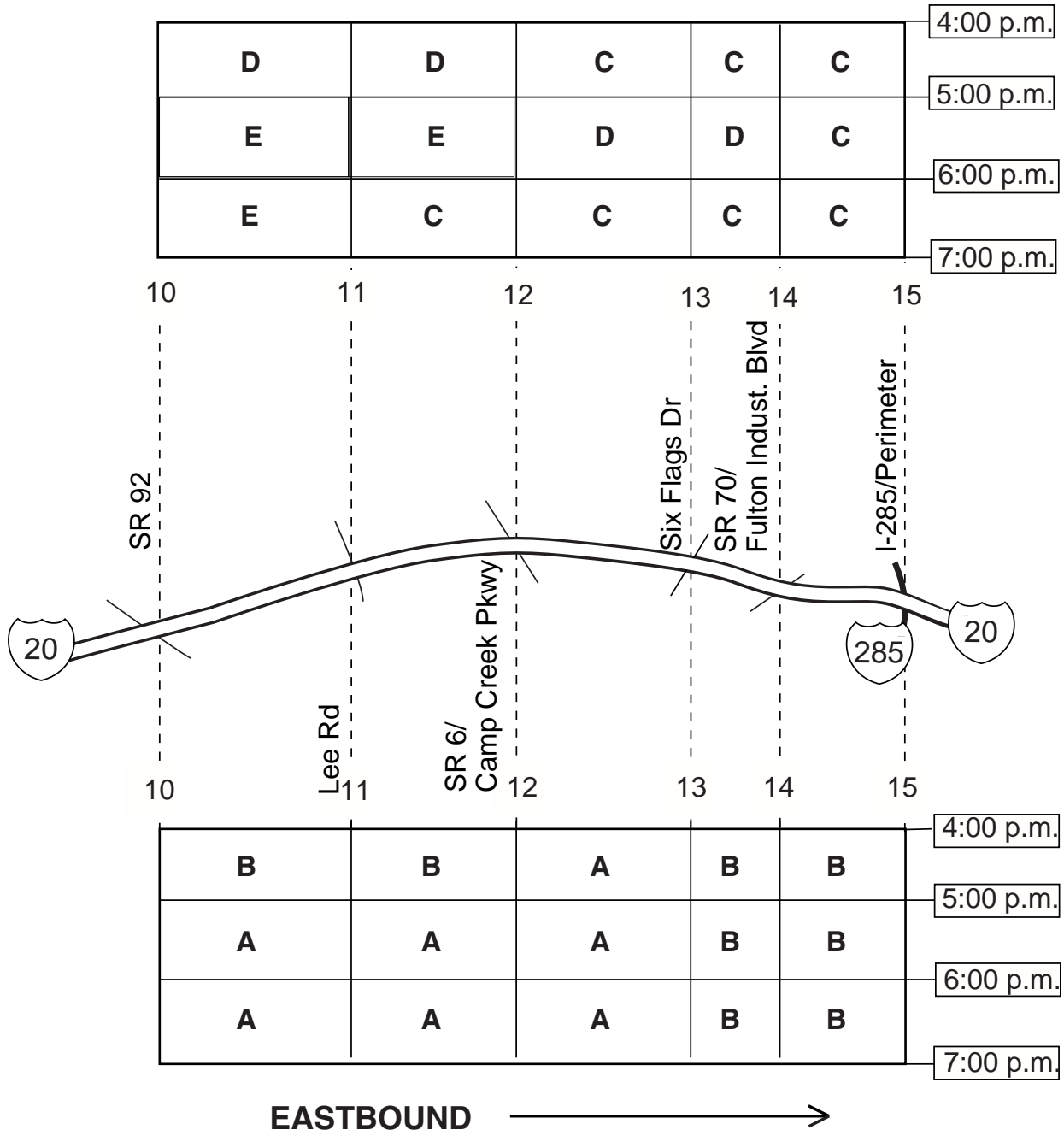


FREEWAY TRAFFIC QUALITY

-  Heavy traffic flow or intermittent congestion
-  Congested traffic flow

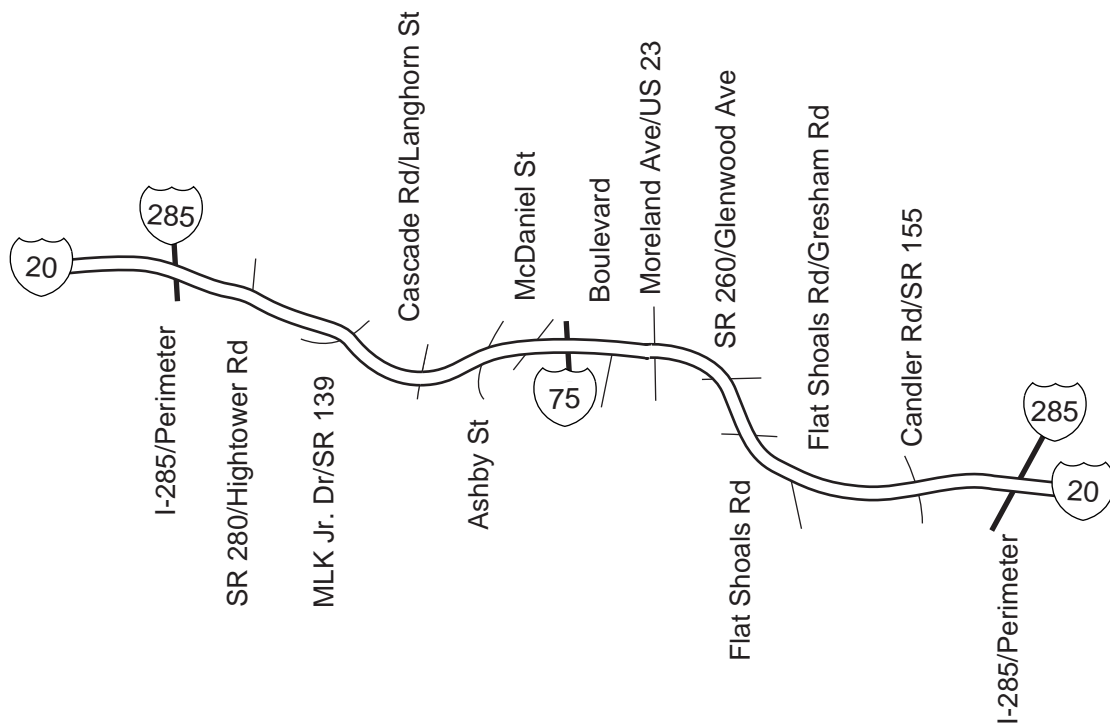
I-20 (WEST OF PERIMETER) EVENING (FALL 1998)

← WESTBOUND



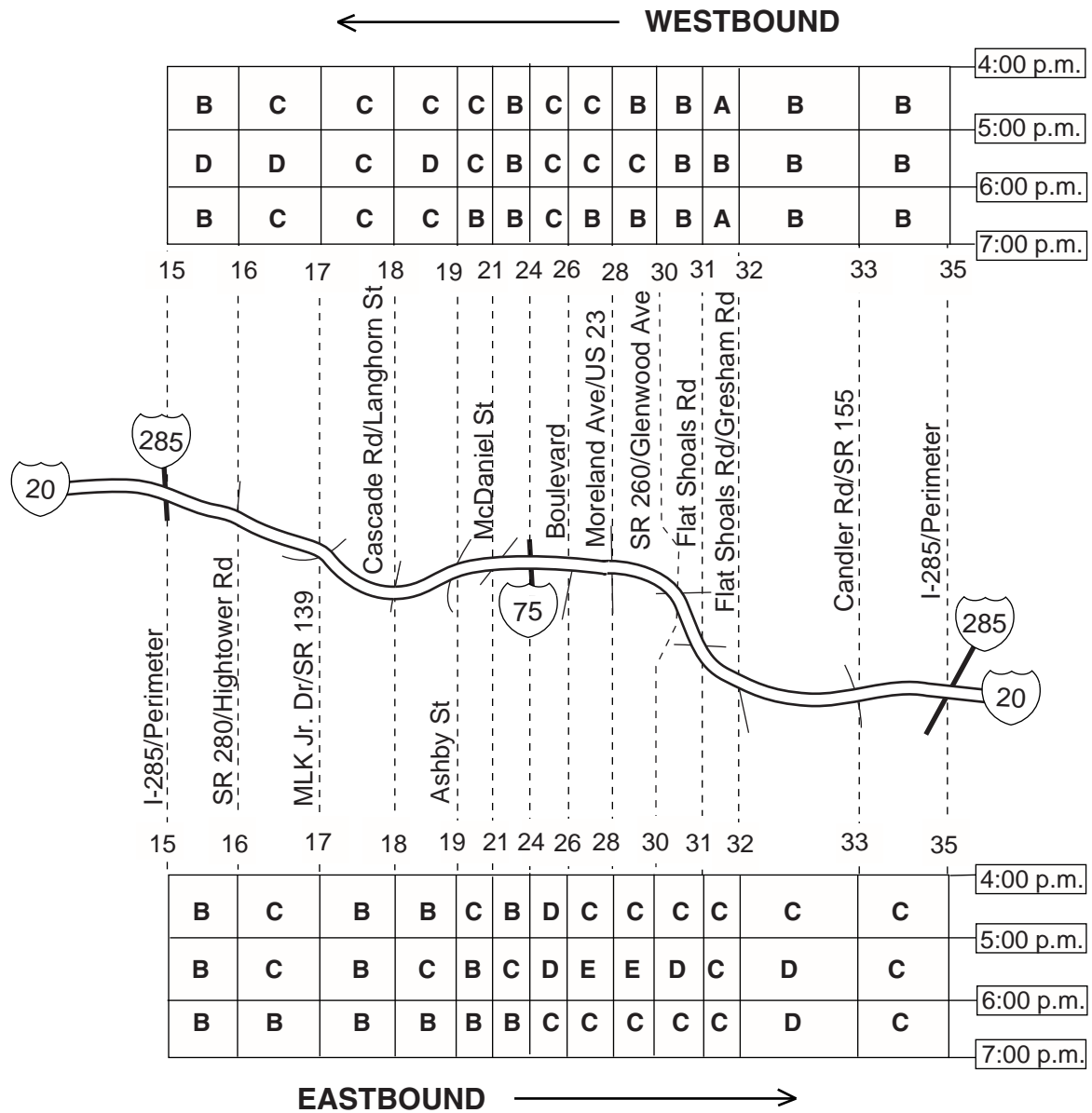


I-20 (INSIDE PERIMETER) EVENING (FALL 1998)



No significant congestion found on I-20 inside the Perimeter.

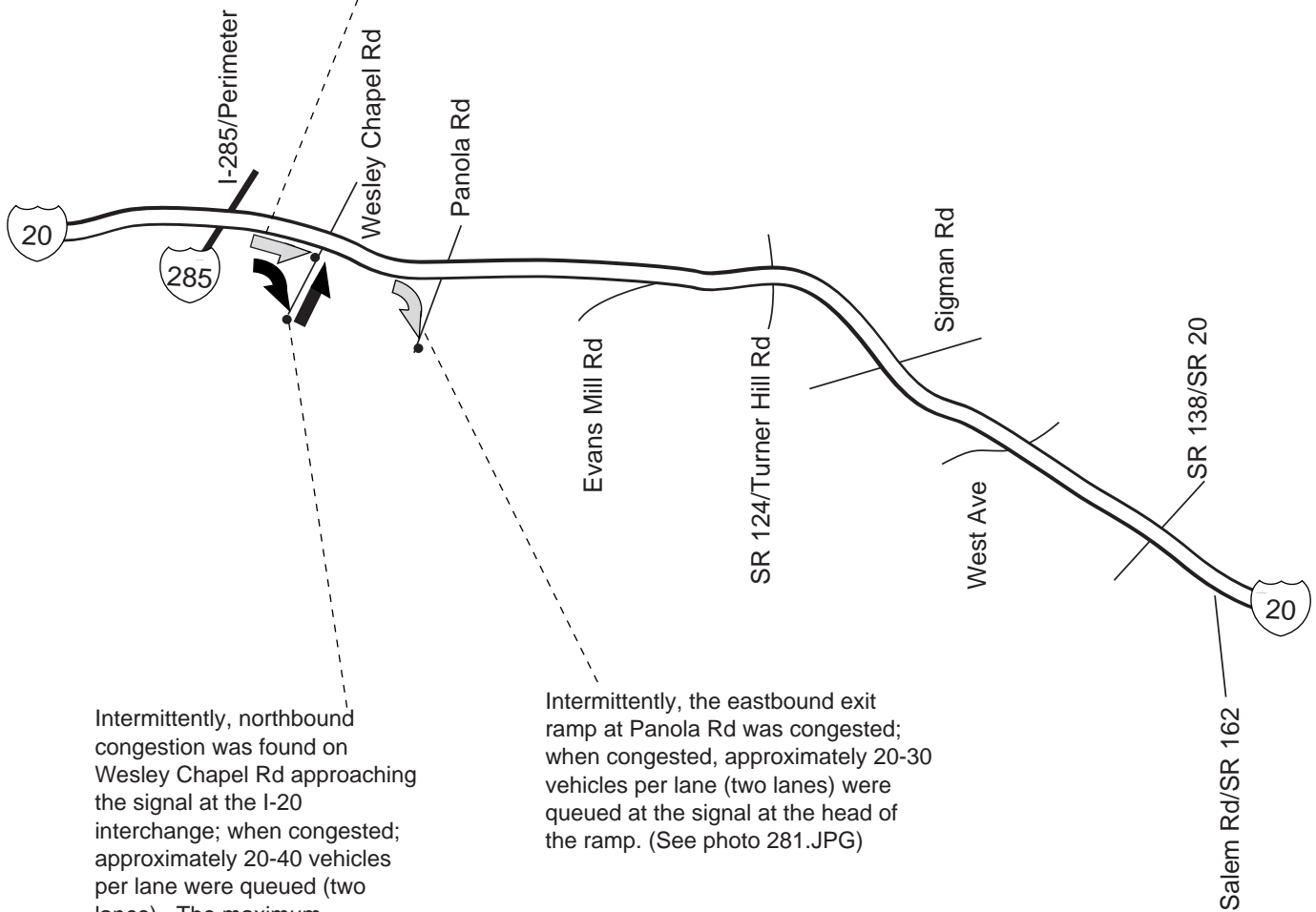
I-20 (INSIDE PERIMETER) EVENING (FALL 1998)



I-20 (EAST OF PERIMETER)

EVENING (FALL 1998)

After 5:30 p.m., intermittent eastbound congestion was found on I-20 between the Perimeter and Wesley Chapel Rd; traffic entering I-20 from the Perimeter and queued vehicles in the right lane exiting at Wesley Chapel Rd contributed to this congestion. (See photos 276 - 279.JPG)



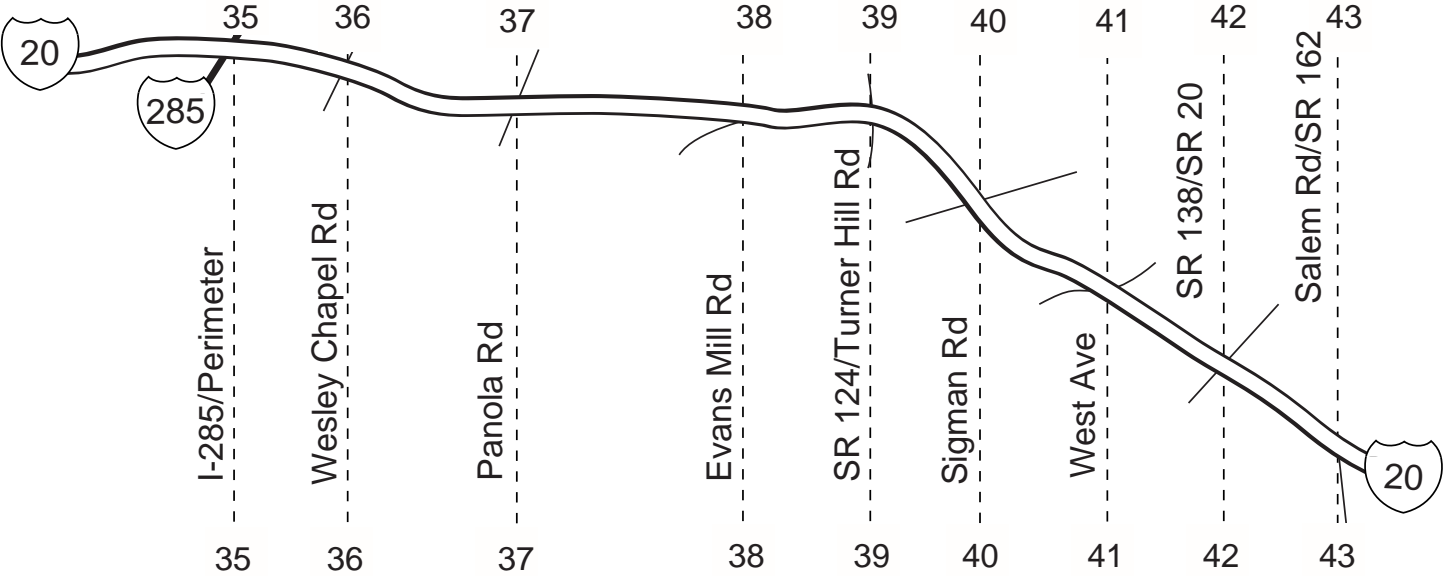
Intermittently, northbound congestion was found on Wesley Chapel Rd approaching the signal at the I-20 interchange; when congested; approximately 20-40 vehicles per lane were queued (two lanes). The maximum observed queue extended back through the upstream signal at Rainbow Dr. (See photo 280.JPG)

Intermittently, the eastbound exit ramp at Panola Rd was congested; when congested, approximately 20-30 vehicles per lane (two lanes) were queued at the signal at the head of the ramp. (See photo 281.JPG)

I-20 (EAST OF PERIMETER)
EVENING (FALL 1998)

← WESTBOUND

C	C	B	B	B	B	B	B	4:00 p.m.
C	C	C	B	B	B	B	B	5:00 p.m.
B	B	B	B	B	B	B	A	6:00 p.m.
								7:00 p.m.

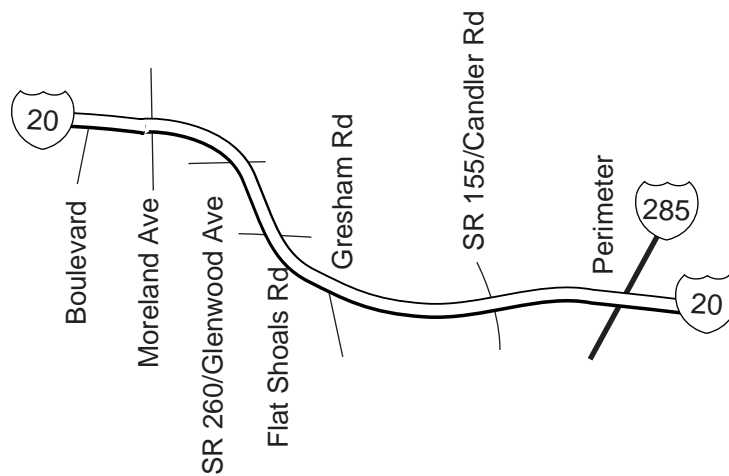


D	D	D	C	C	C	C	B	4:00 p.m.
F (45)	E	D	C	C	C	C	B	5:00 p.m.
E	D	C	C	B	B	B	B	6:00 p.m.
								7:00 p.m.



EASTBOUND →



I-20 (HOV)
EVENING (FALL 1998)

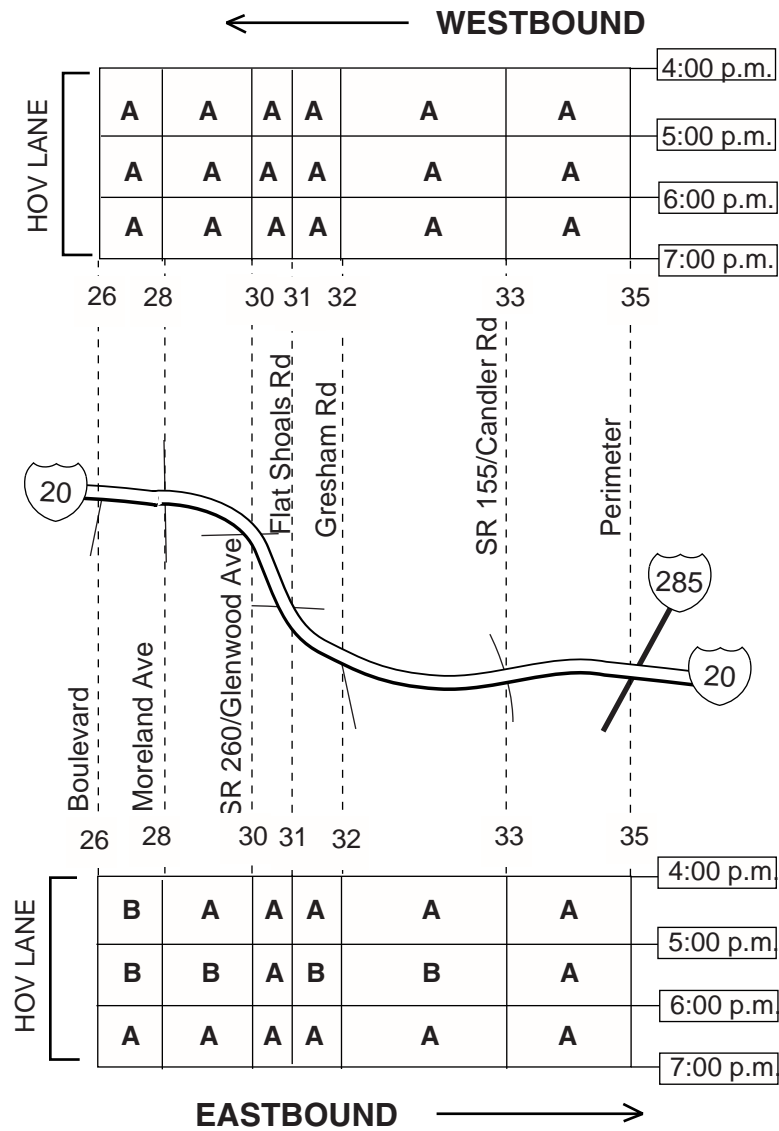


FREEWAY TRAFFIC QUALITY

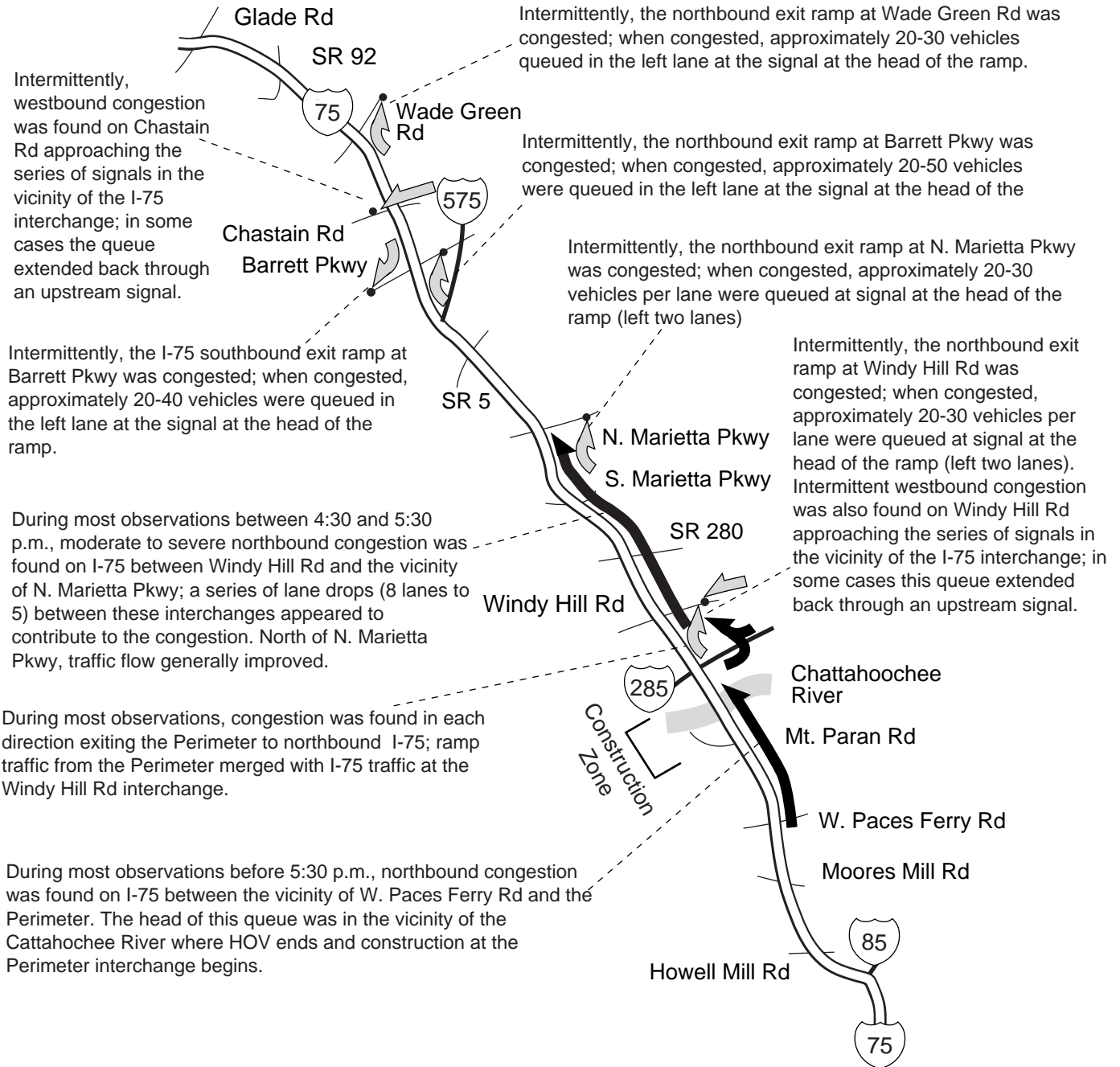
-  Heavy traffic flow or intermittent congestion
-  Congested traffic flow

I-20 (HOV)

EVENING (FALL 1998)



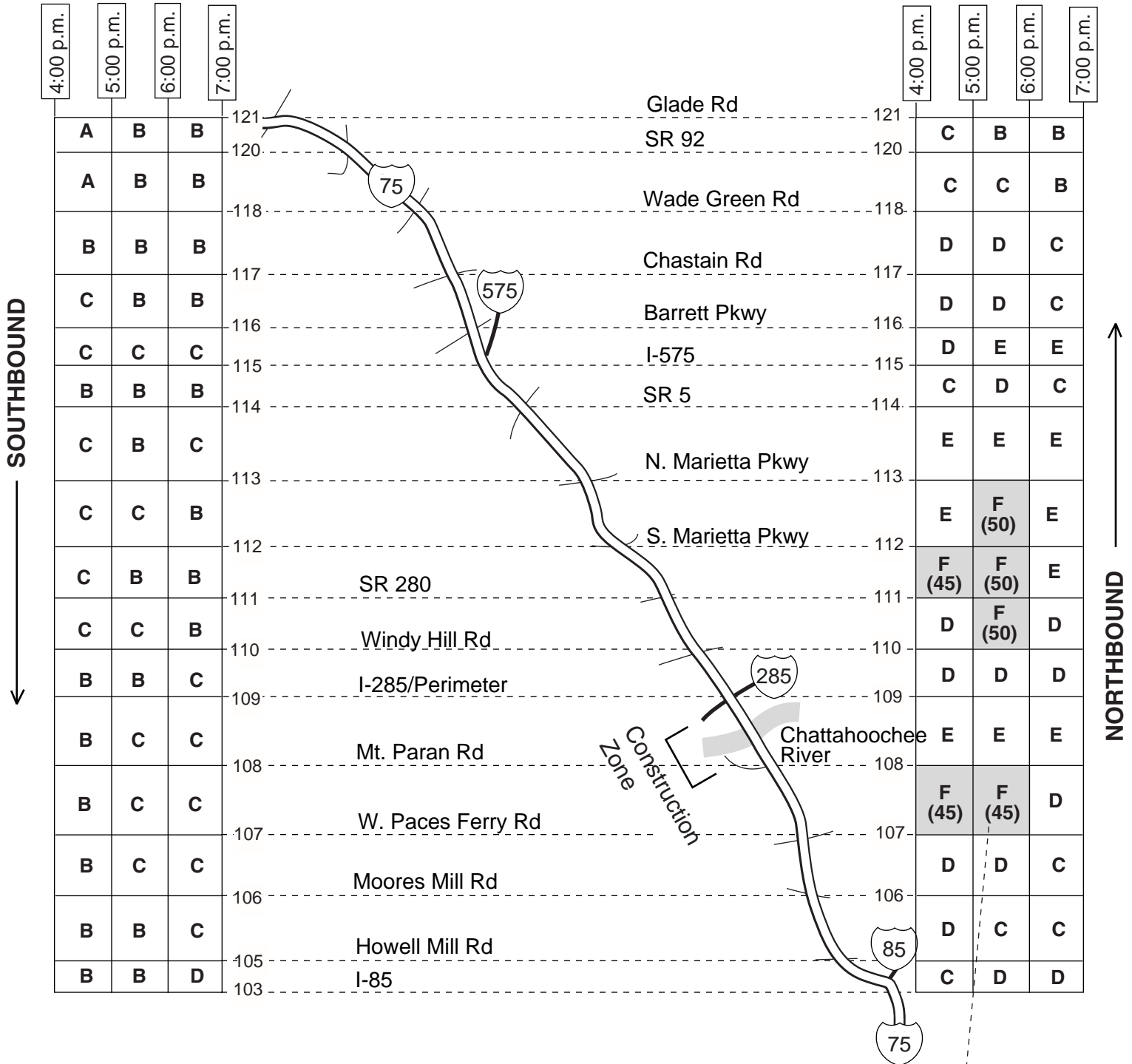
I-75 (NORTH) EVENING (FALL 1998)



FREeway TRAFFIC QUALITY

- Heavy traffic flow or intermittent congestion
- Congested traffic flow

I-75 (NORTH) EVENING (FALL 1998)

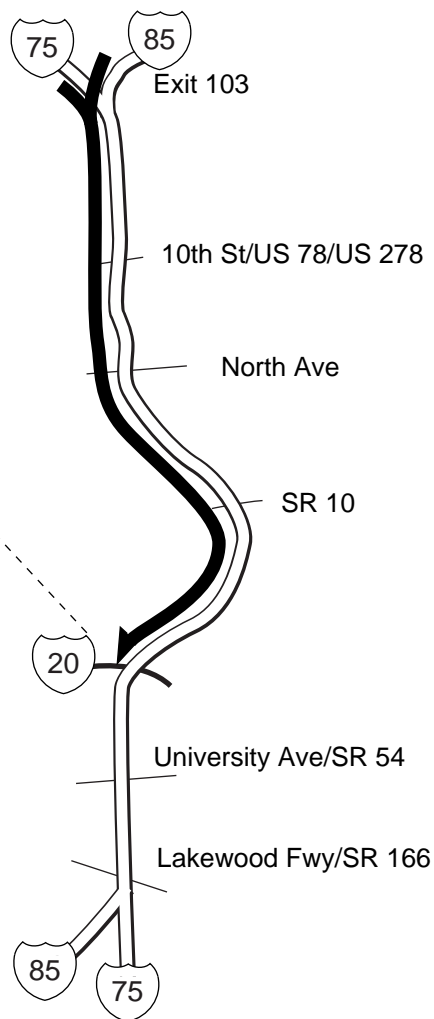


This level-of-service rating (F45) represents the mathematical average of densities for the entire hour from 5:00 to 6:00 p.m. Densities between 5:00 and 5:30 p.m. (on 3 different days) typically ranged from approximately 45 and 75 pcplpm which correspond to estimated average speeds of 20-40 mph. During two observations between 5:30 and 6:00 p.m., significant congestion was not found.





I-75 / 85 EVENING (FALL 1998)

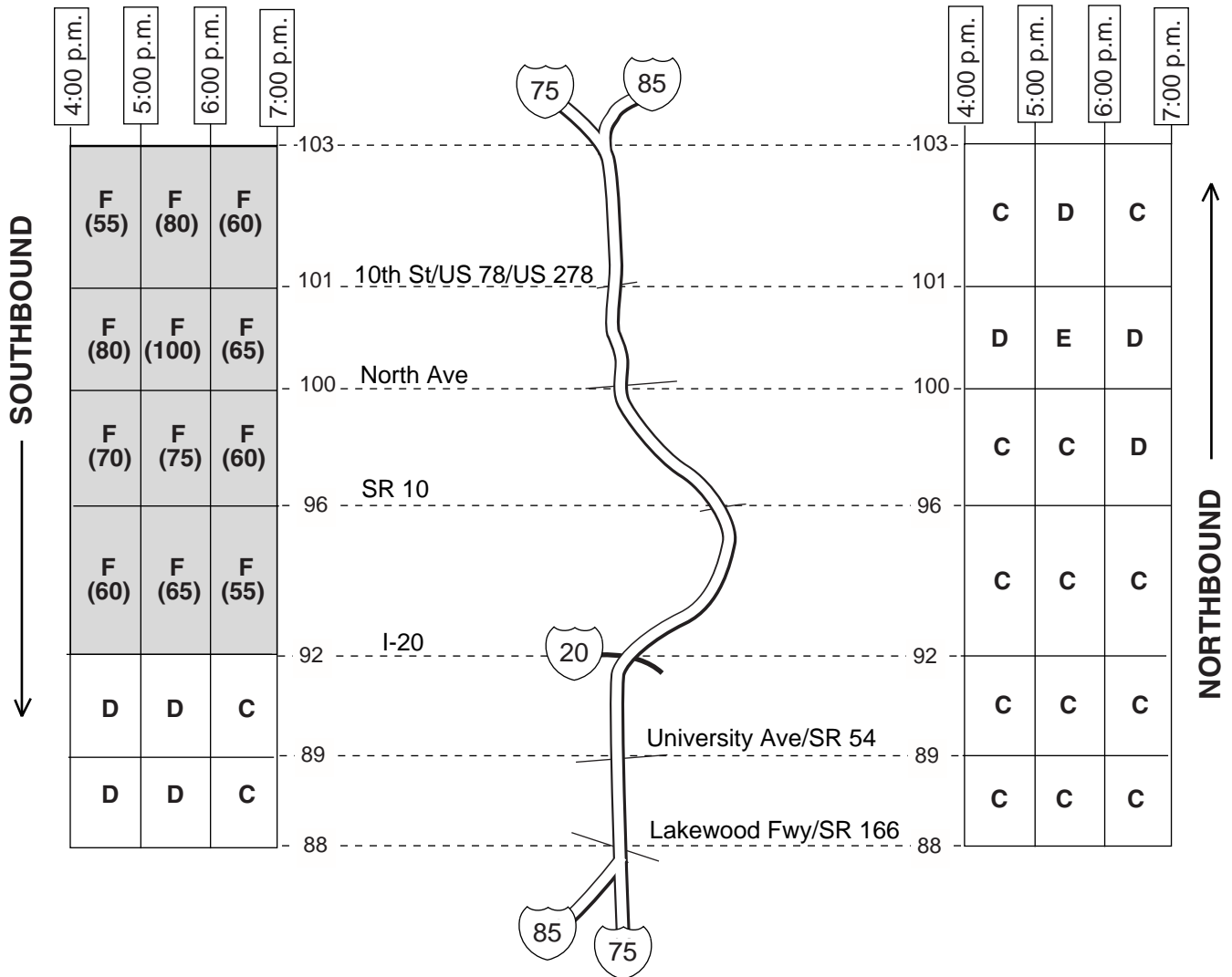
During all observations, moderate to severe southbound congestion was found on I-75/85 between the merge at exit 103 and downtown. Merging and weaving at the series of closely spaced interchange ramps appeared to exacerbate this congestion. Estimated speeds along I-75/85 typically averaged less than 25 mph (intermittent stop-and-go conditions were found during the peak hour). South of I-20, traffic typically improved.



FREEWAY TRAFFIC QUALITY

-  Heavy traffic flow or intermittent congestion
-  Congested traffic flow

I-75 / 85 EVENING (FALL 1998)



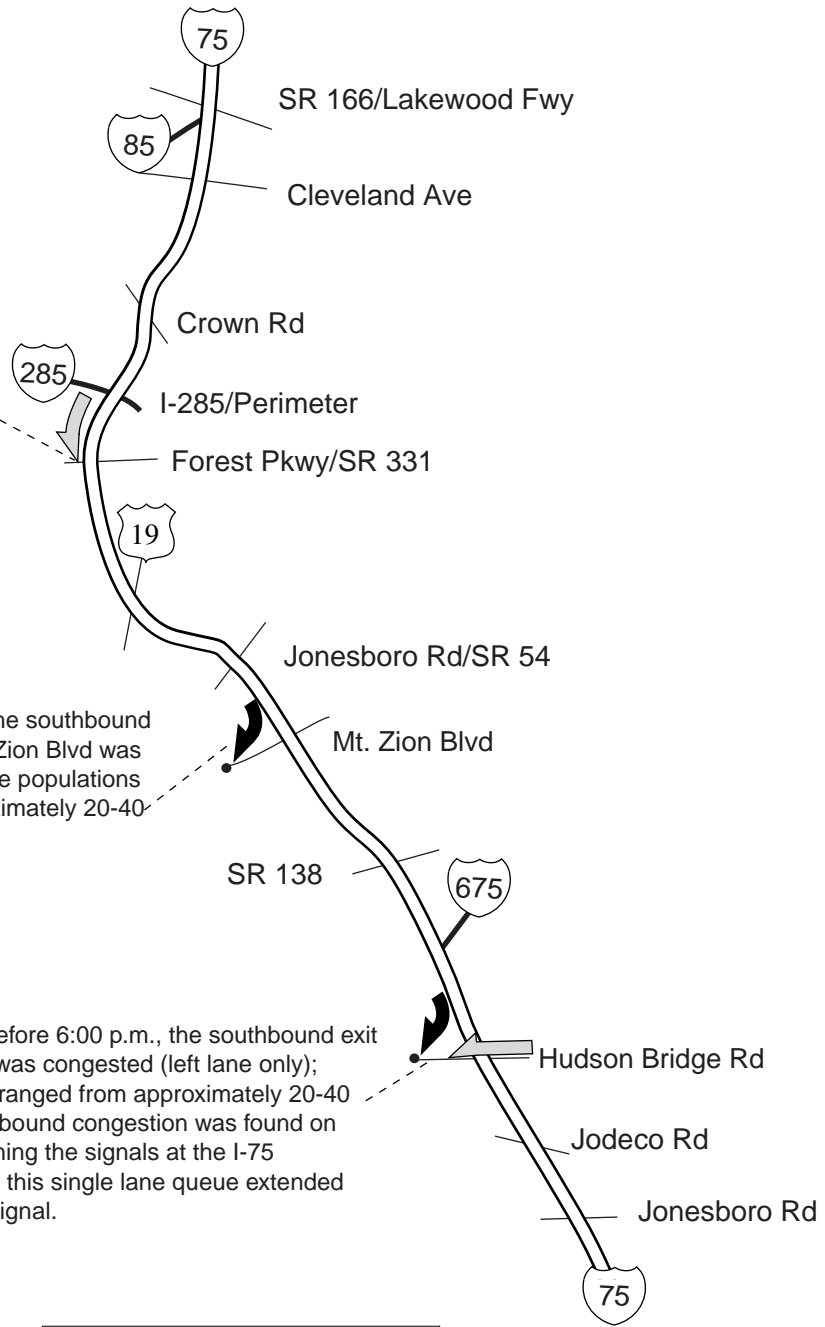


I-75 (SOUTH) EVENING (FALL 1998)



During most observations between 5:00 and 6:00 p.m., a short zone of southbound congestion was found on I-75 between the Perimeter and Forest Pkwy; traffic merging from the Perimeter appeared to cause this slowing. Delays in general were not significant.

During most observations, the southbound exit ramp to westbound Mt. Zion Blvd was congested; single lane queue populations typically ranged from approximately 20-40 vehicles.

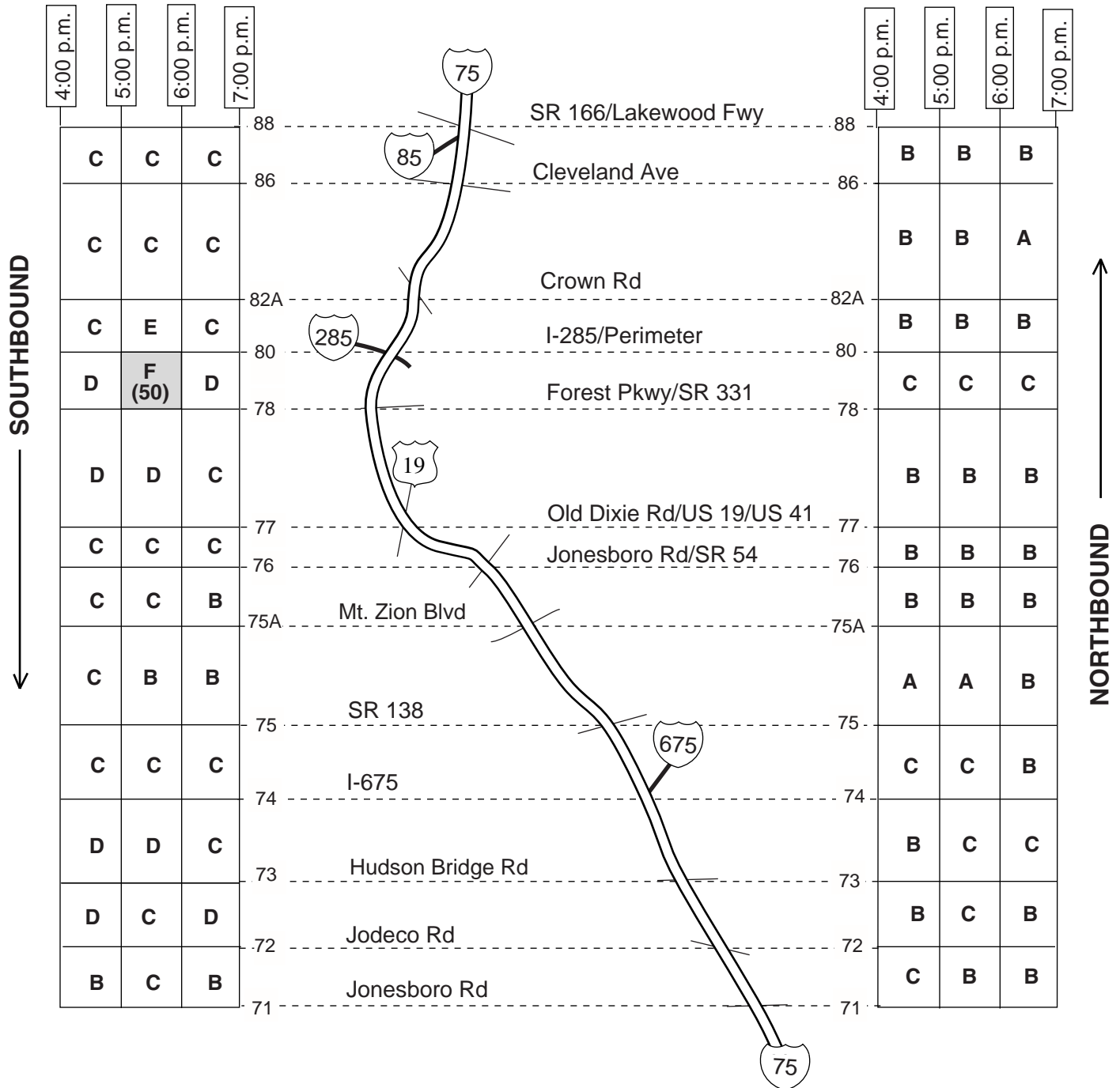
During most observations before 6:00 p.m., the southbound exit ramp at Hudson Bridge Rd was congested (left lane only); queue populations typically ranged from approximately 20-40 vehicles. Intermittently, westbound congestion was found on Hudson Bridge Rd approaching the signals at the I-75 interchange; in some cases, this single lane queue extended back through an upstream signal.



FREEWAY TRAFFIC QUALITY

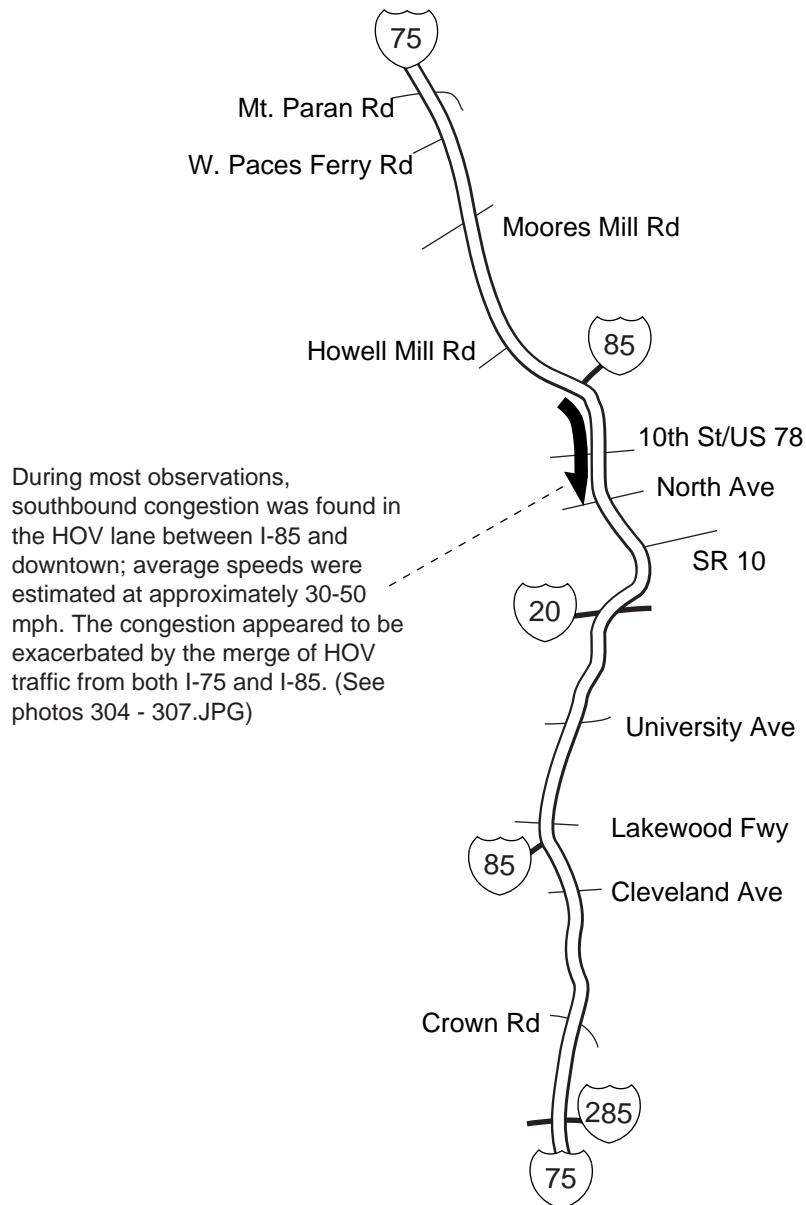
-  Heavy traffic flow or intermittent congestion
-  Congested traffic flow

I-75 (SOUTH) EVENING (FALL 1998)







I-75 (HOV) EVENING (FALL 1998)

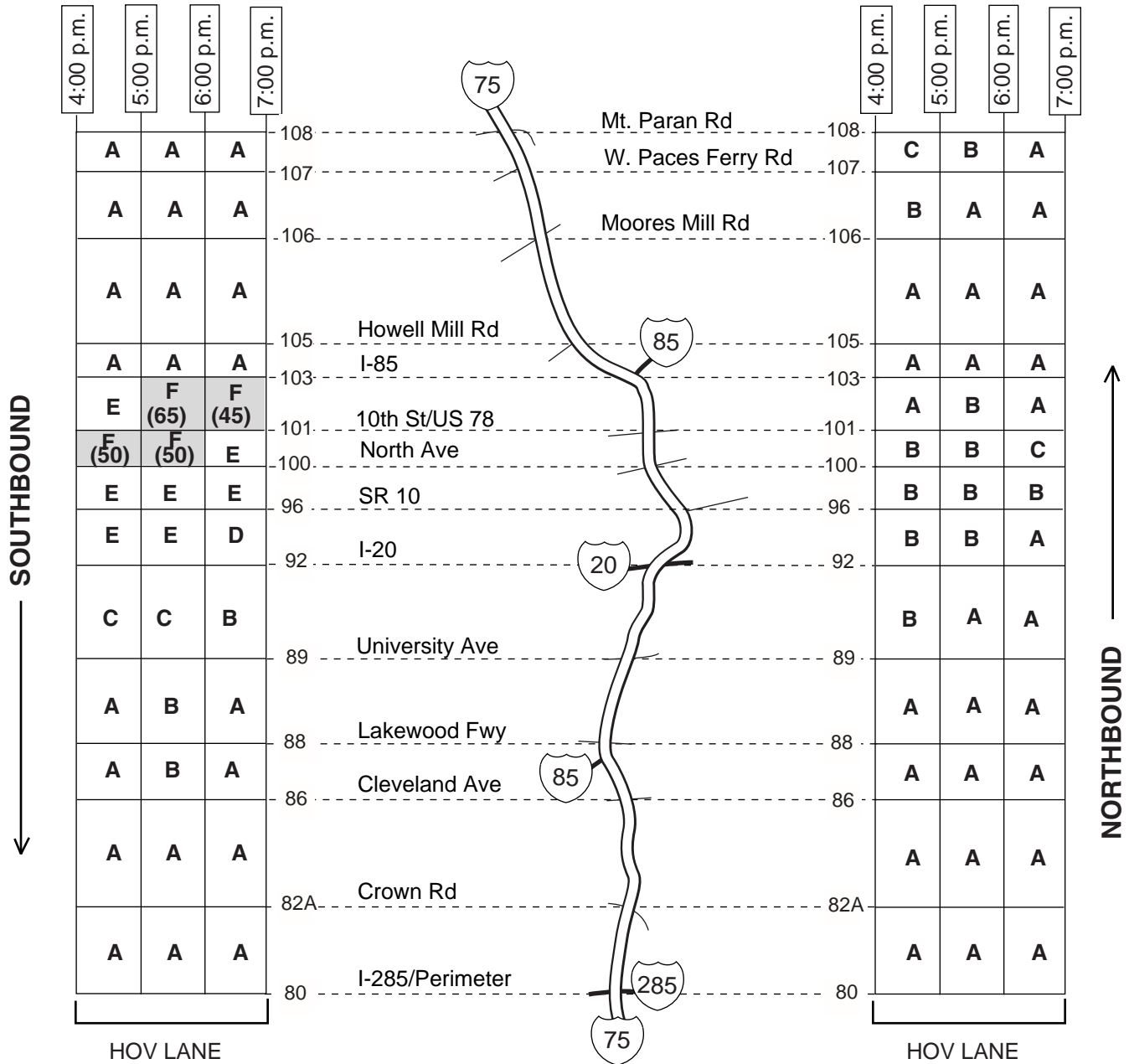


FREEWAY TRAFFIC QUALITY

-  Heavy traffic flow or intermittent congestion
-  Congested traffic flow

I-75 (HOV)

EVENING (FALL 1998)





I-85 (NORTH) EVENING (FALL 1998)

Intermittently, southbound congestion was found on Lawrenceville Rd approaching the signal at I-85; when congested, queue populations ranged from approximately 20-30 vehicles per lane (two lanes).

Intermittently, westbound congestion was found on Peachtree Rd approaching the signal at I-85; when congested, queue populations contained approximately 20 vehicles (one lane).

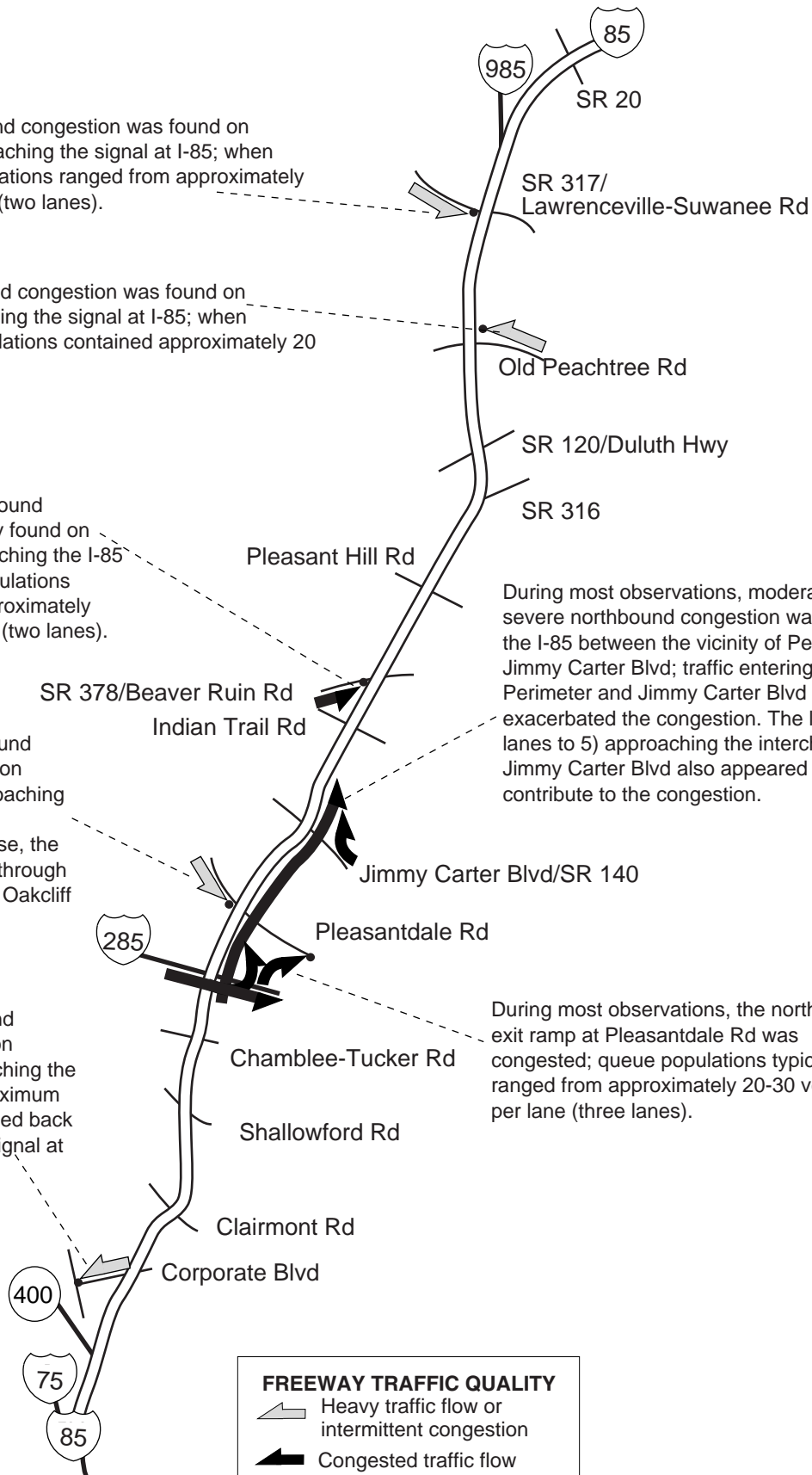
Before 6:00 p.m., eastbound congestion was typically found on Beaver Ruin Rd approaching the I-85 interchange; queue populations ranged widely from approximately 20-45 vehicles per lane (two lanes).

Intermittently, southbound congestion was found on Pleasantdale Rd approaching the signal at the I-85 interchange; in one case, the queue extended back through the upstream signal at Oakcliff Rd.

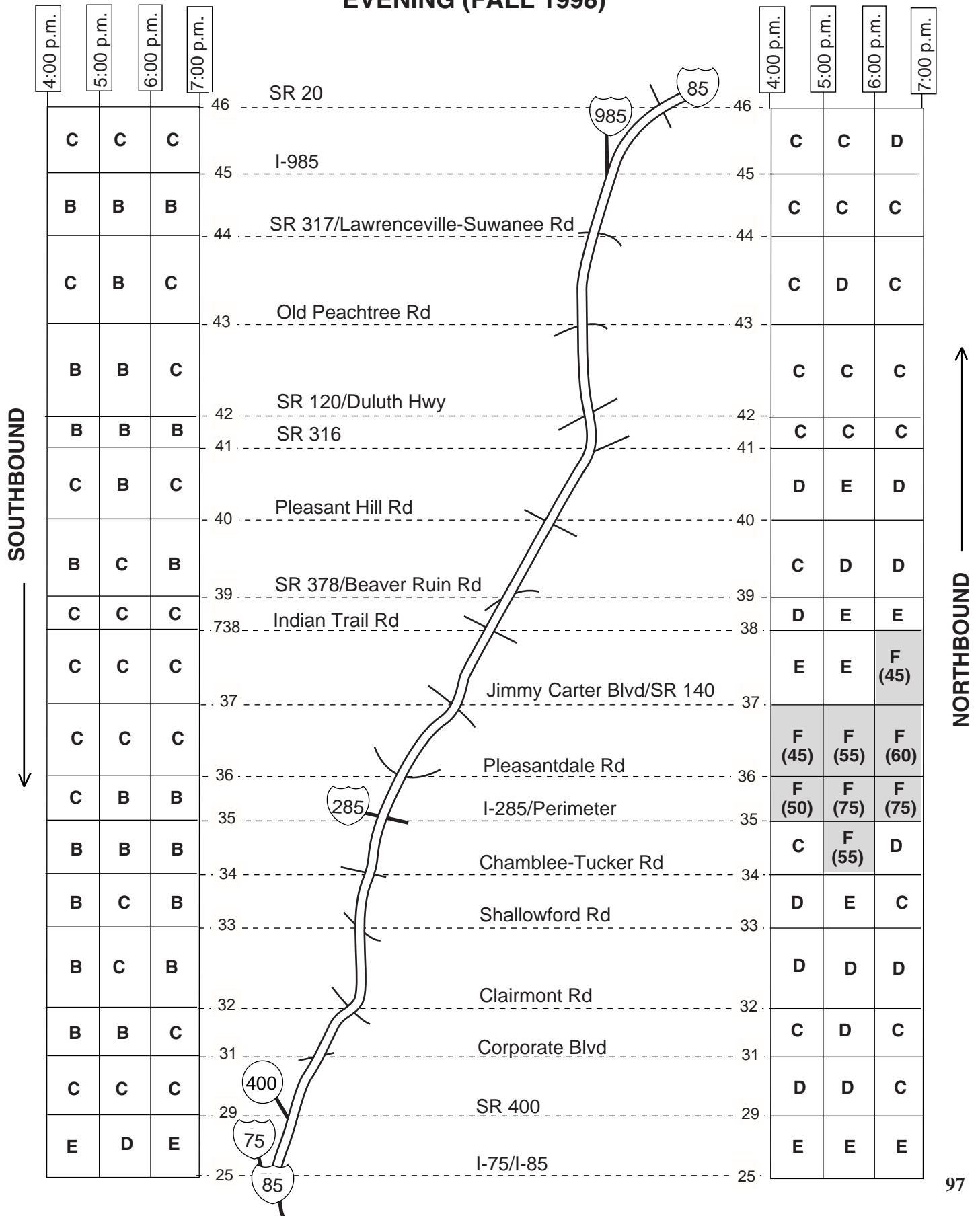
Intermittently, westbound congestion was found on Corporate Blvd approaching the signal at SR 13; the maximum observed queue extended back through the upstream signal at the I-85 interchange.

During most observations, moderate to severe northbound congestion was found on the I-85 between the vicinity of Perimeter and Jimmy Carter Blvd; traffic entering from the Perimeter and Jimmy Carter Blvd exacerbated the congestion. The lane drop (6 lanes to 5) approaching the interchange at Jimmy Carter Blvd also appeared to contribute to the congestion.

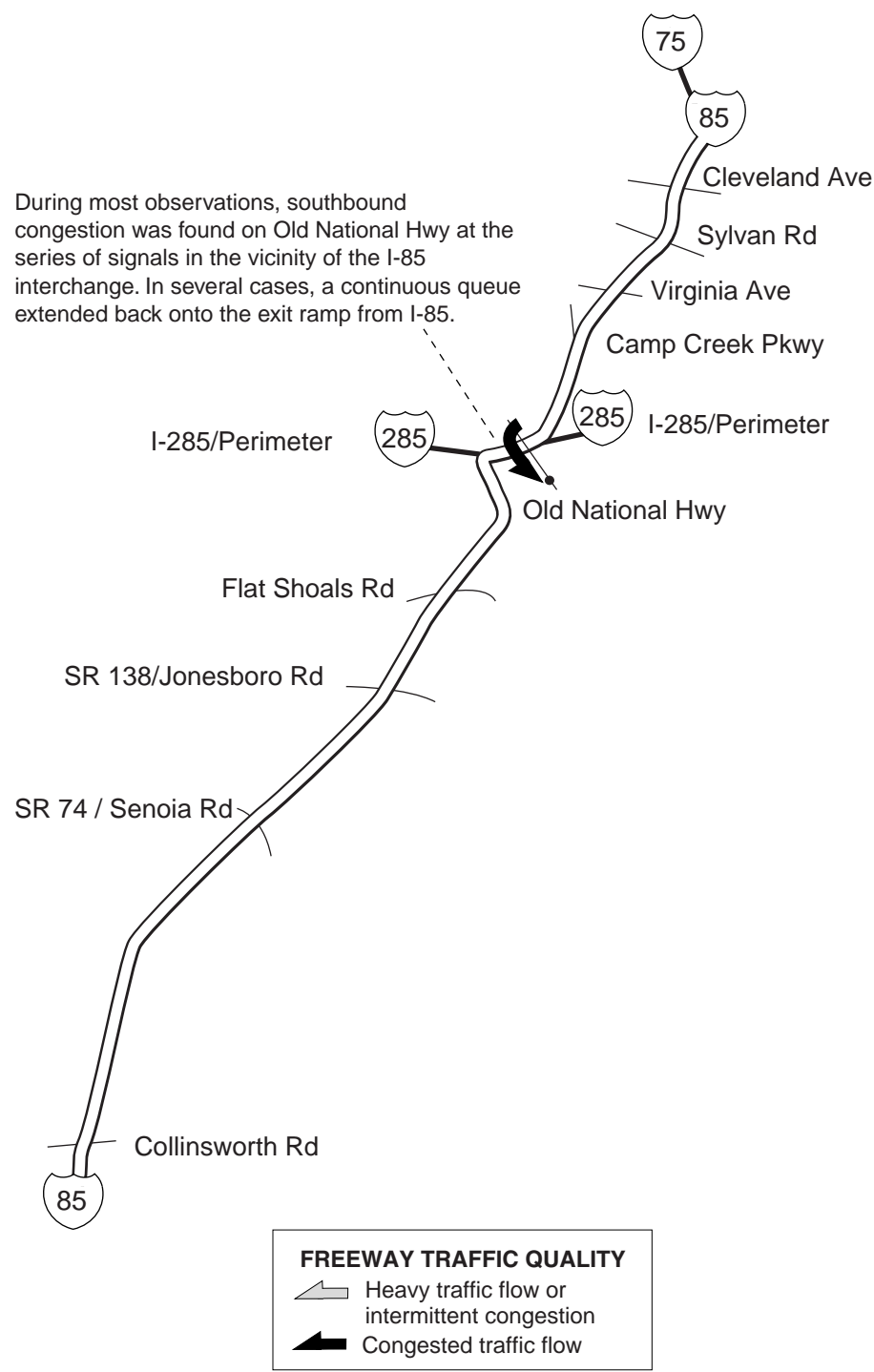
During most observations, the northbound exit ramp at Pleasantdale Rd was congested; queue populations typically ranged from approximately 20-30 vehicles per lane (three lanes).



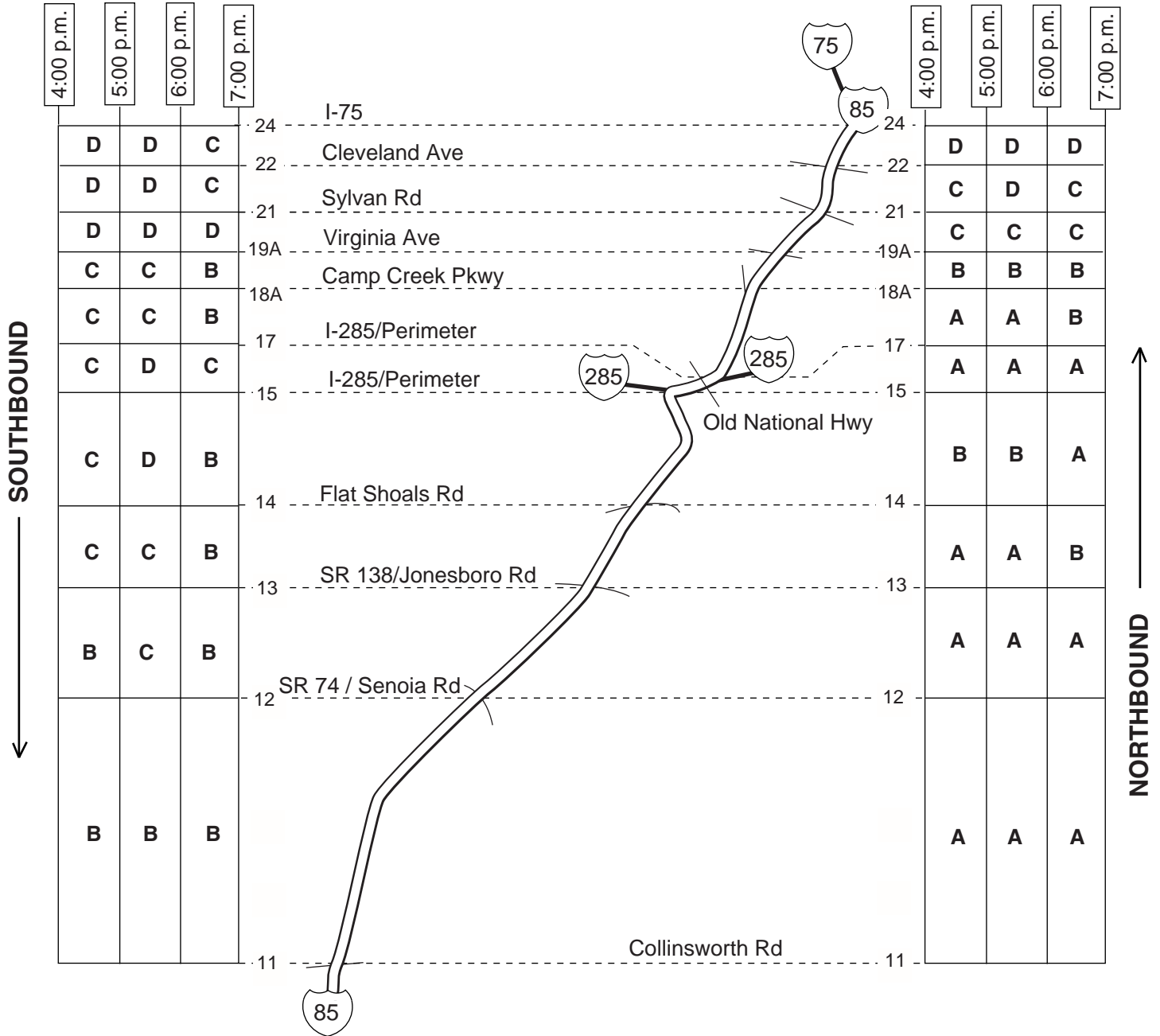
I-85 (NORTH) EVENING (FALL 1998)



**I-85 (SOUTH)
EVENING (FALL 1998)**



I-85 (SOUTH) EVENING (FALL 1998)

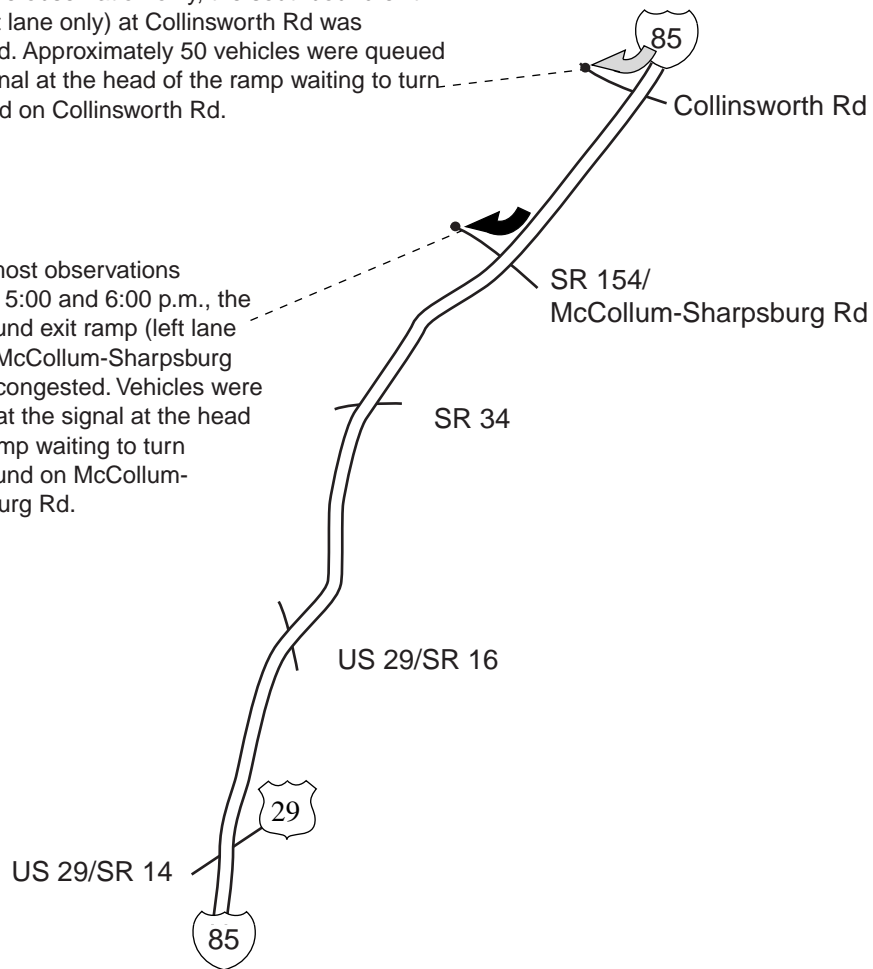






I-85 (FAR SOUTH) EVENING (FALL 1998)

During one observation only, the southbound exit ramp (left lane only) at Collinsworth Rd was congested. Approximately 50 vehicles were queued at the signal at the head of the ramp waiting to turn eastbound on Collinsworth Rd.

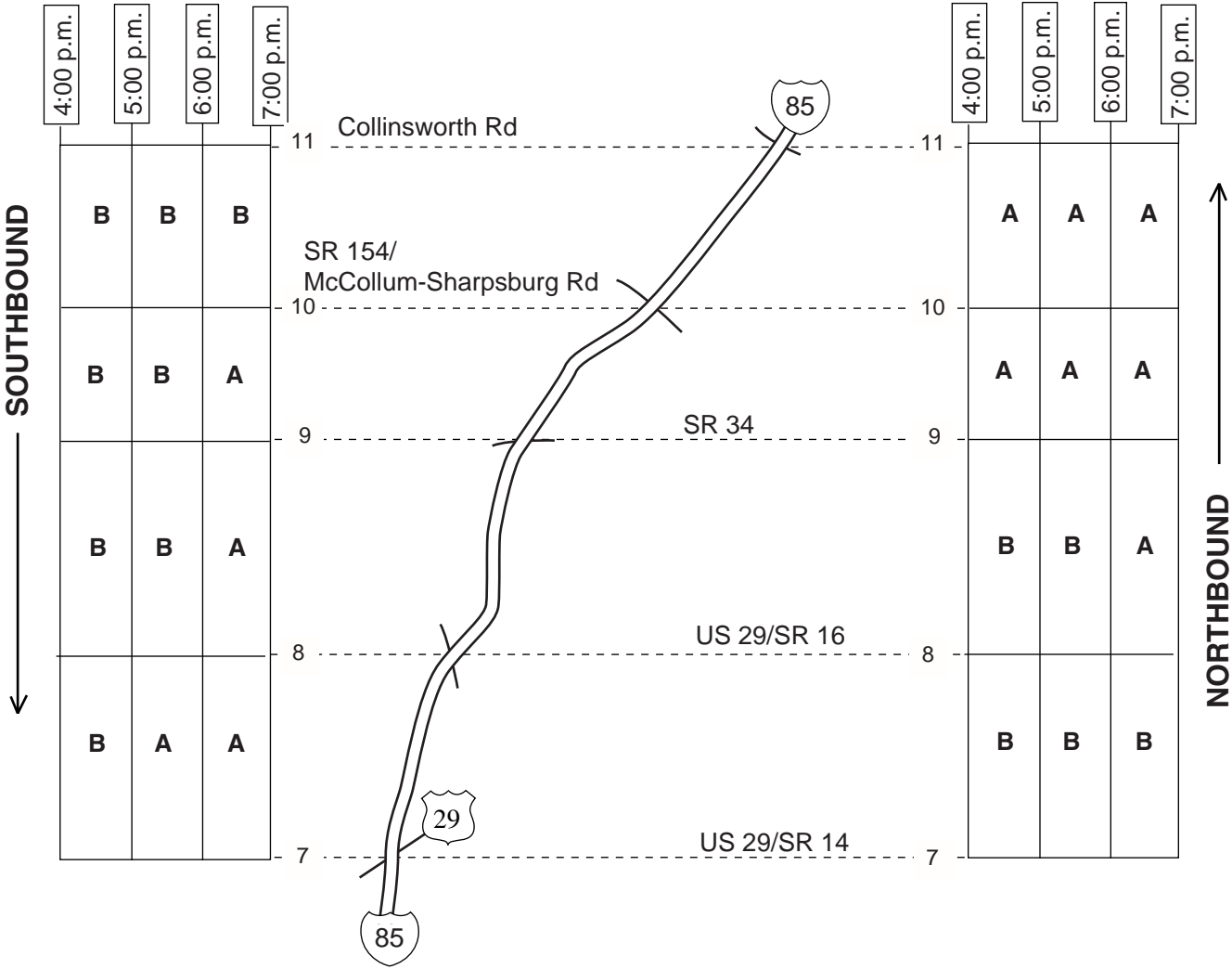
During most observations between 5:00 and 6:00 p.m., the southbound exit ramp (left lane only) at McCollum-Sharpsburg Rd was congested. Vehicles were queued at the signal at the head of the ramp waiting to turn southbound on McCollum-Sharpsburg Rd.



FREEWAY TRAFFIC QUALITY

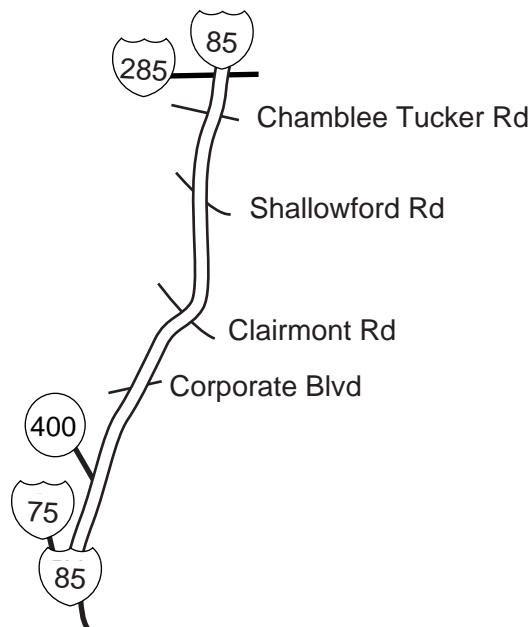
-  Heavy traffic flow or intermittent congestion
-  Congested traffic flow

I-85 (FAR SOUTH) EVENING (FALL 1998)

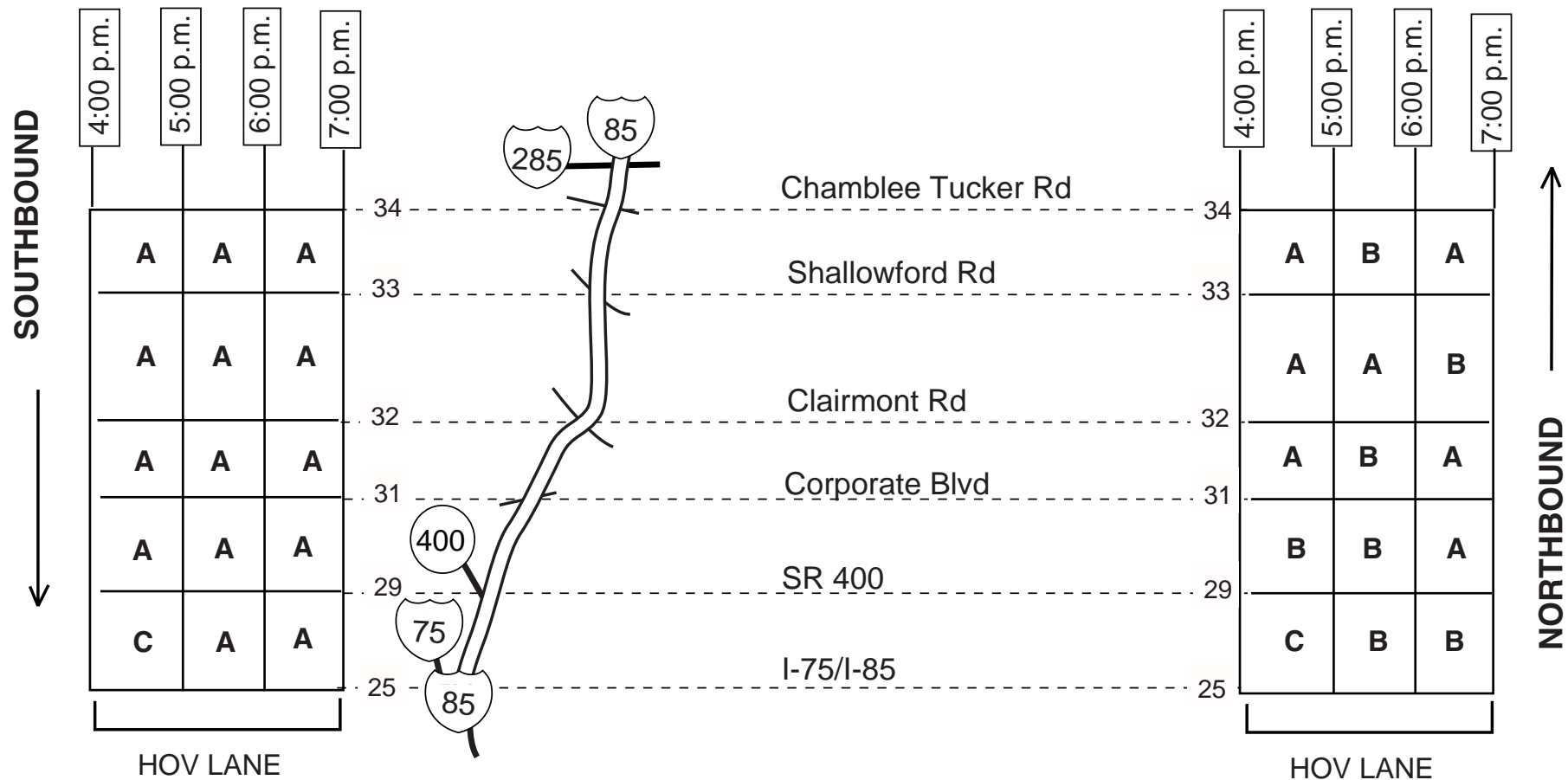




I-85 HOV
EVENING (FALL 1998)

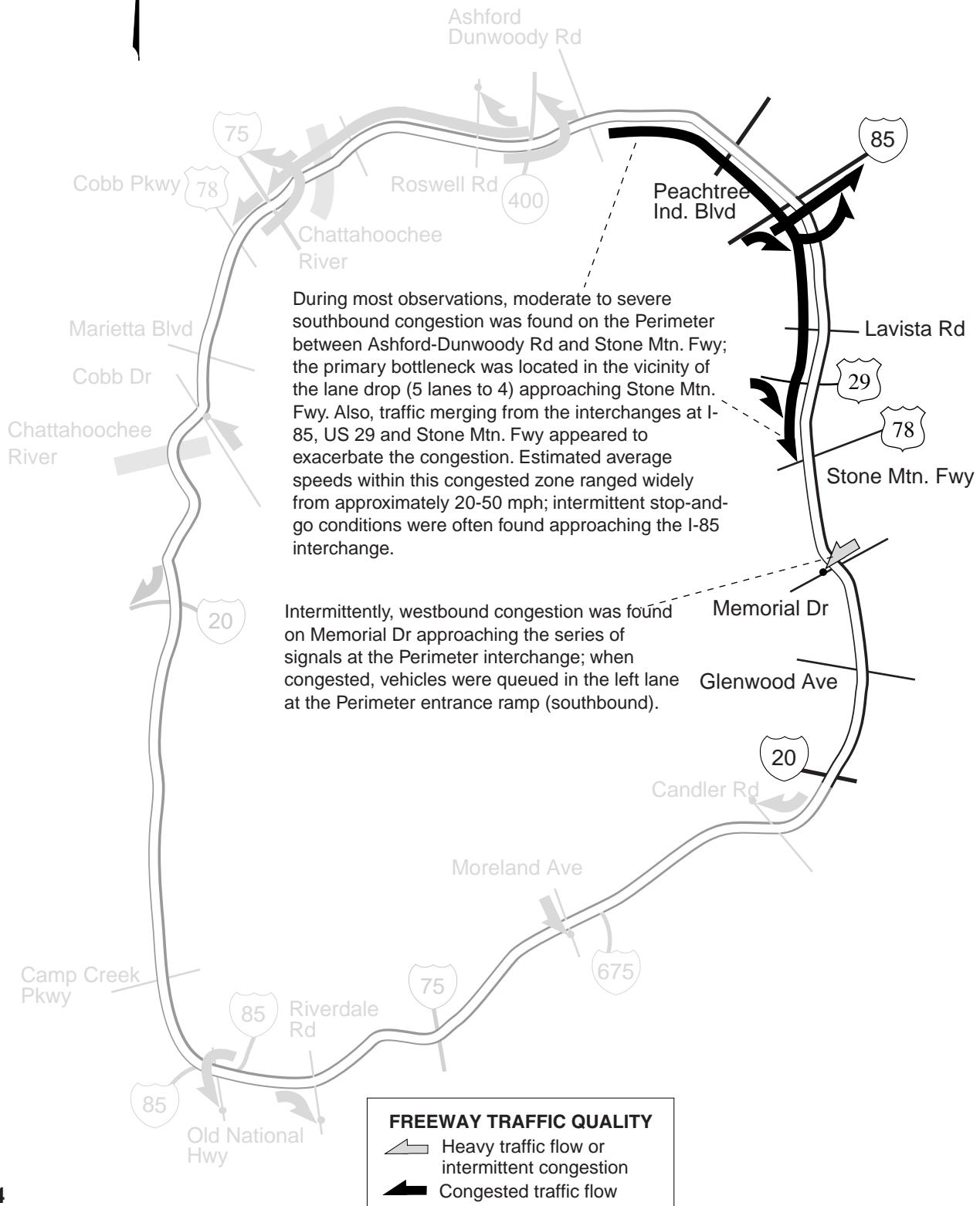


**I-85 HOV
EVENING (FALL 1998)**

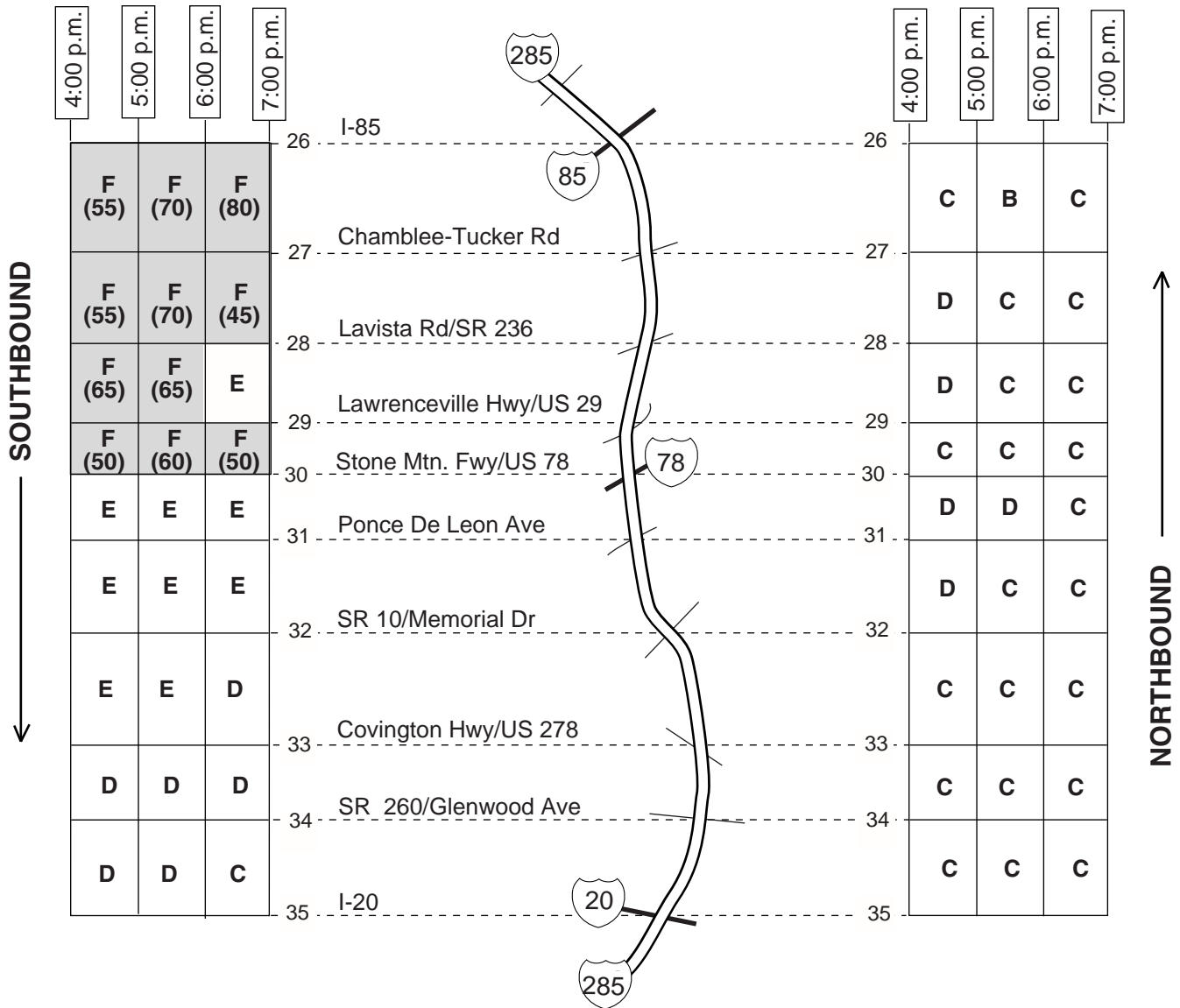




PERIMETER - EAST (I-285) EVENING (FALL 1998)

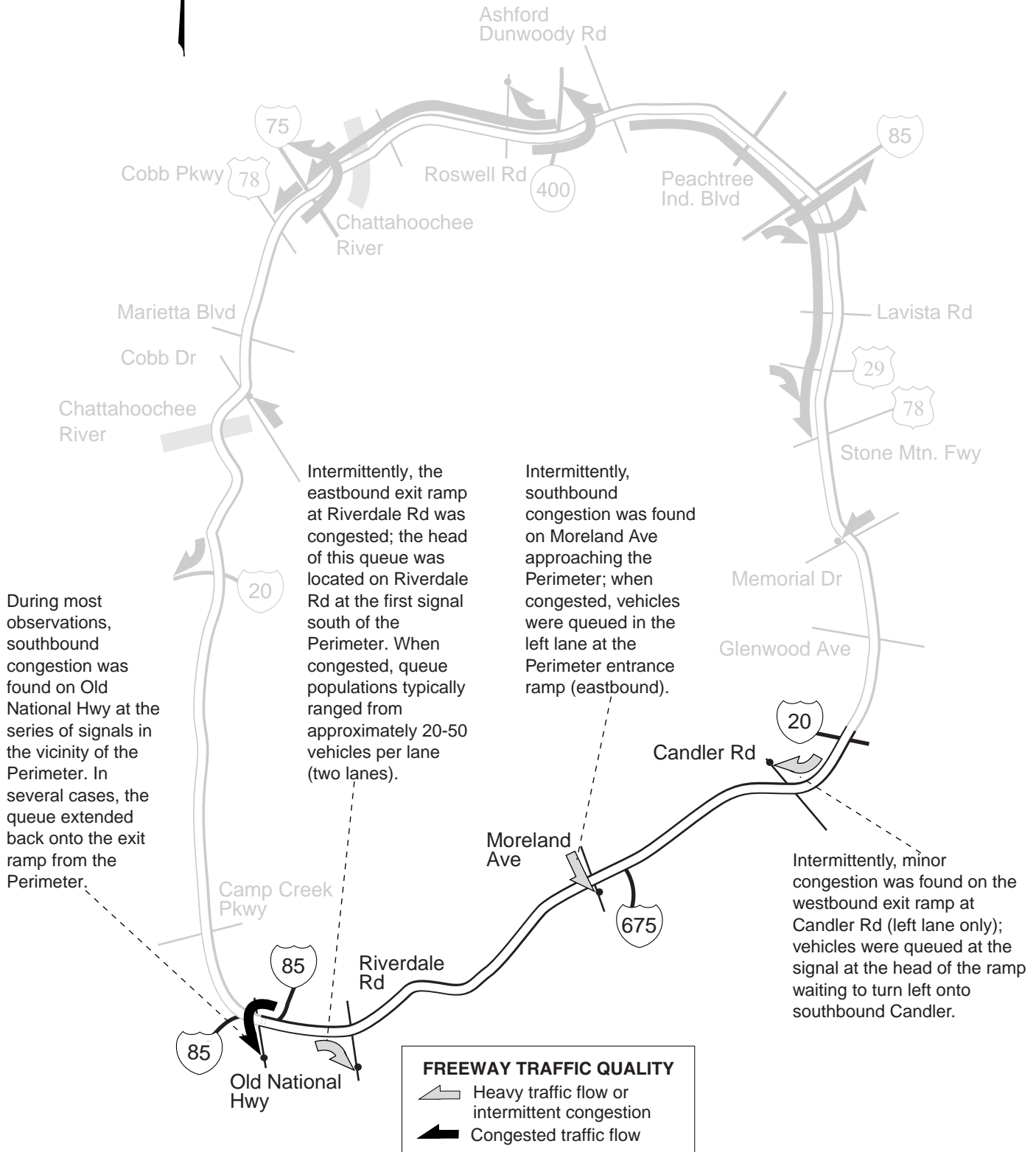


PERIMETER - EAST (I-285) EVENING (FALL 1998)

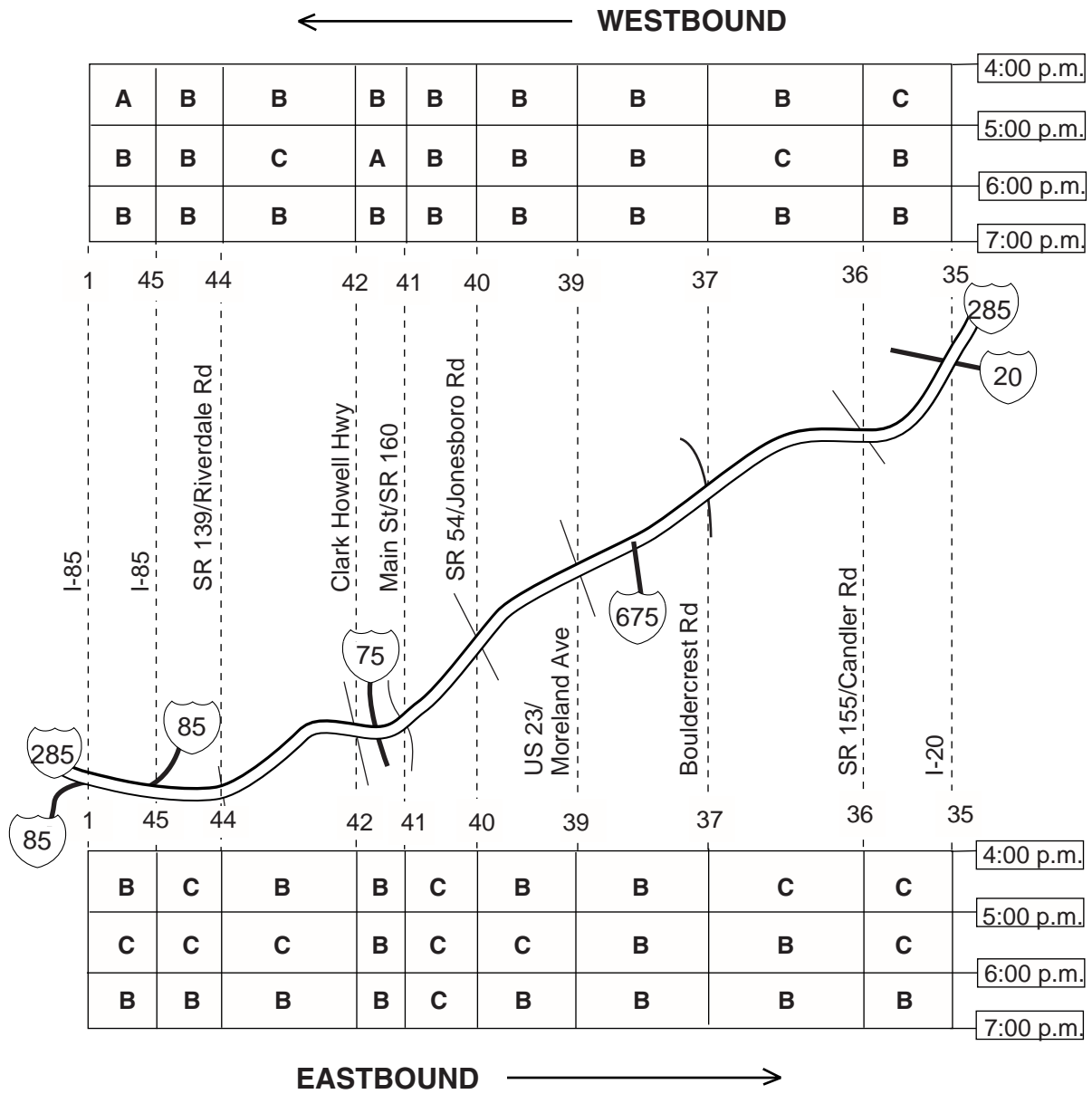




PERIMETER - SOUTH (I-285) EVENING (FALL 1998)

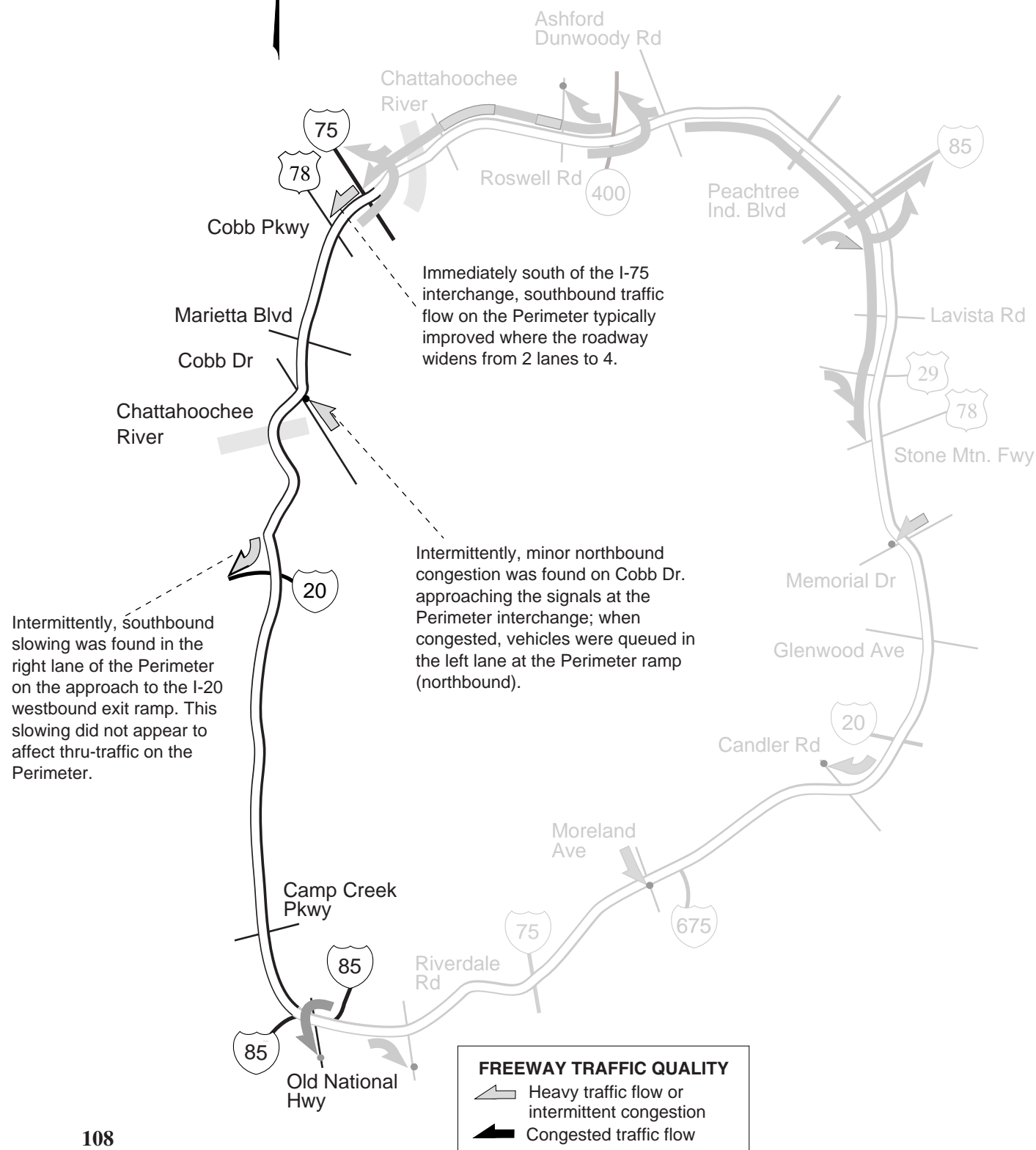


PERIMETER - SOUTH (I-285) EVENING (FALL 1998)

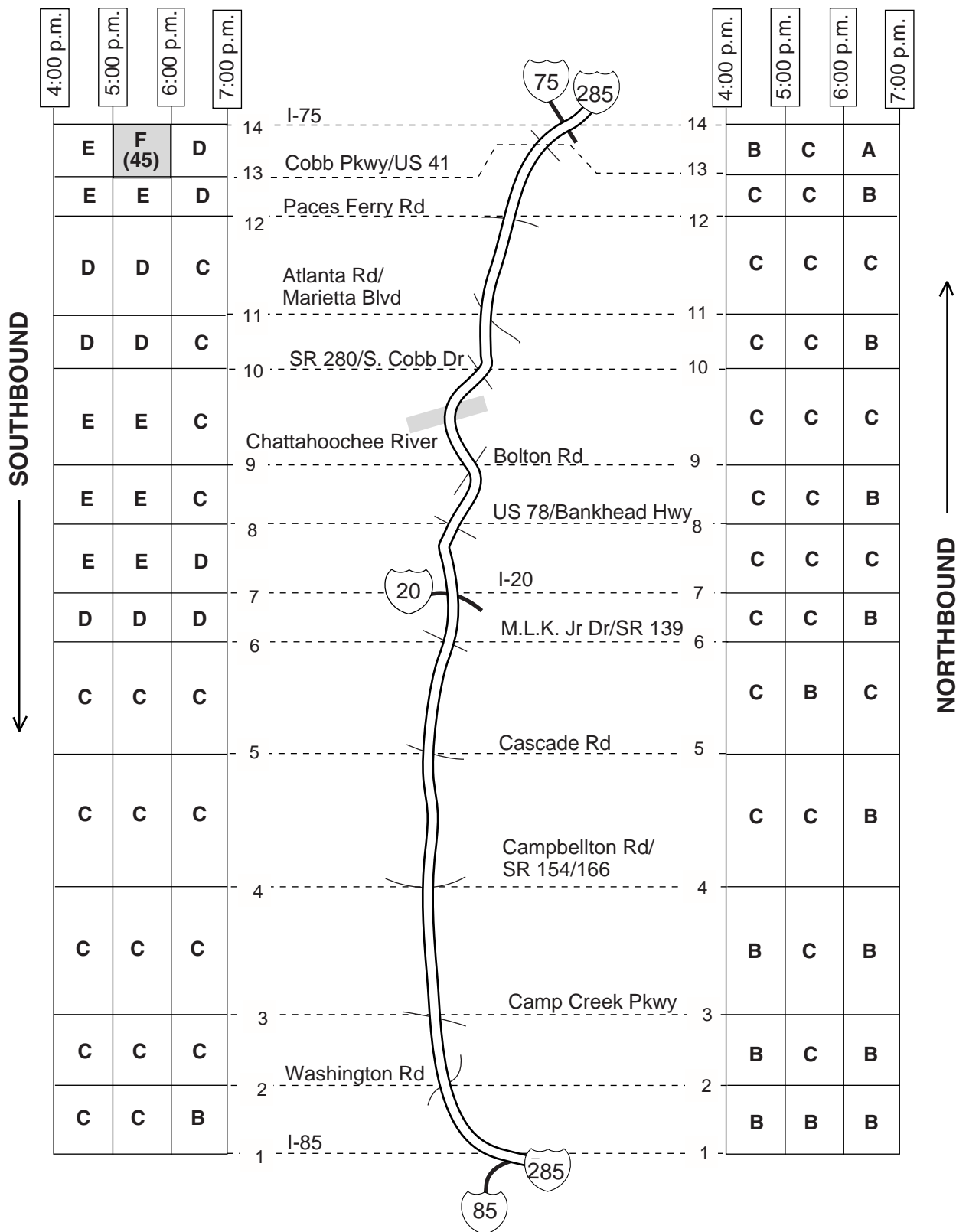




PERIMETER - WEST (I-285) EVENING (FALL 1998)



PERIMETER - WEST (I-285) EVENING (FALL 1998)



During most observations, congestion was found on the westbound exit ramp at Roswell Rd; in some cases the queue extended back into the right lane of the Perimeter. Moderate to severe northbound congestion was also found on Roswell Rd approaching the signals at the Perimeter interchange.

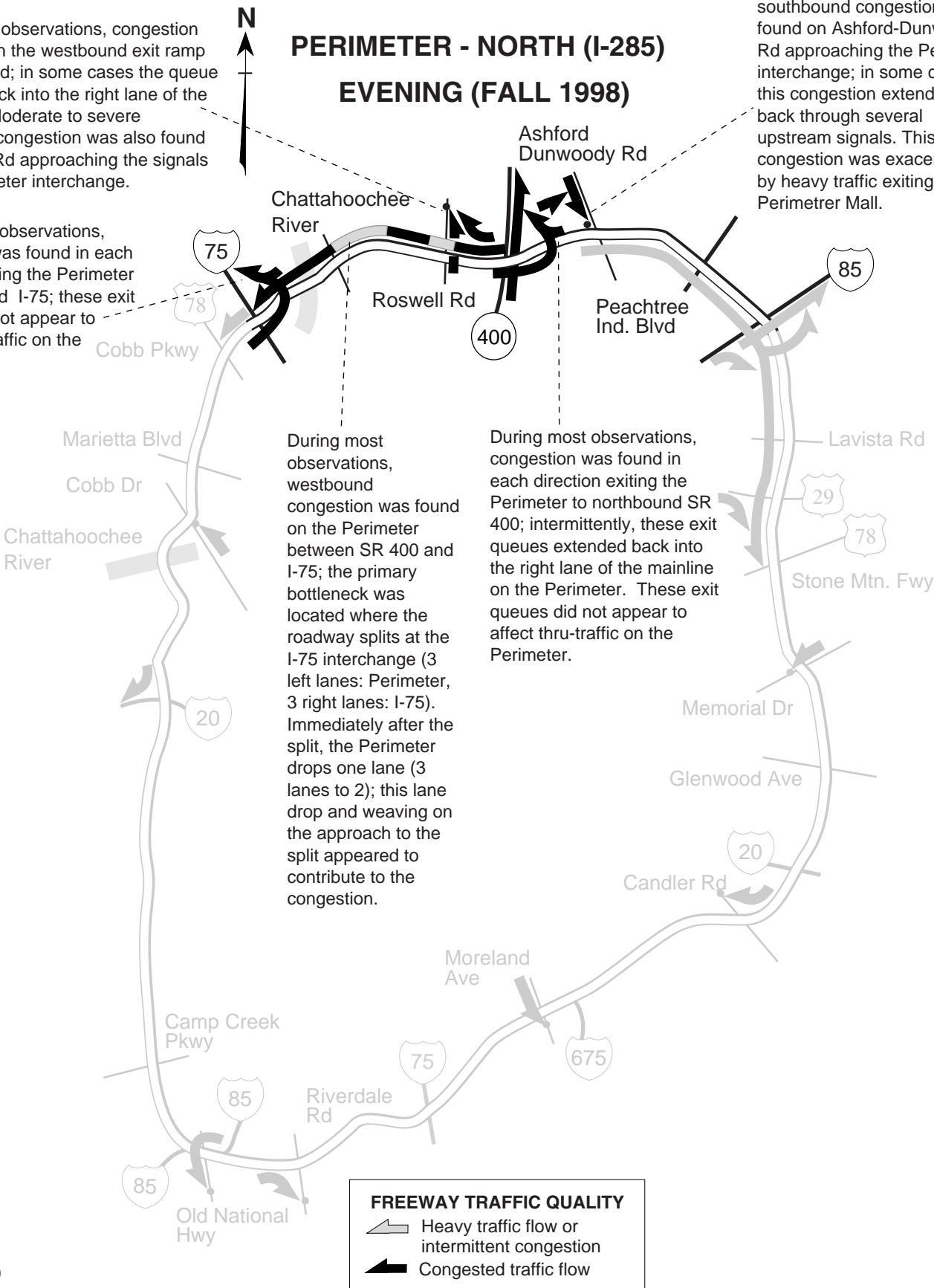
During most observations, congestion was found in each direction exiting the Perimeter to northbound I-75; these exit queues did not appear to affect thru-traffic on the Perimeter.

PERIMETER - NORTH (I-285) EVENING (FALL 1998)

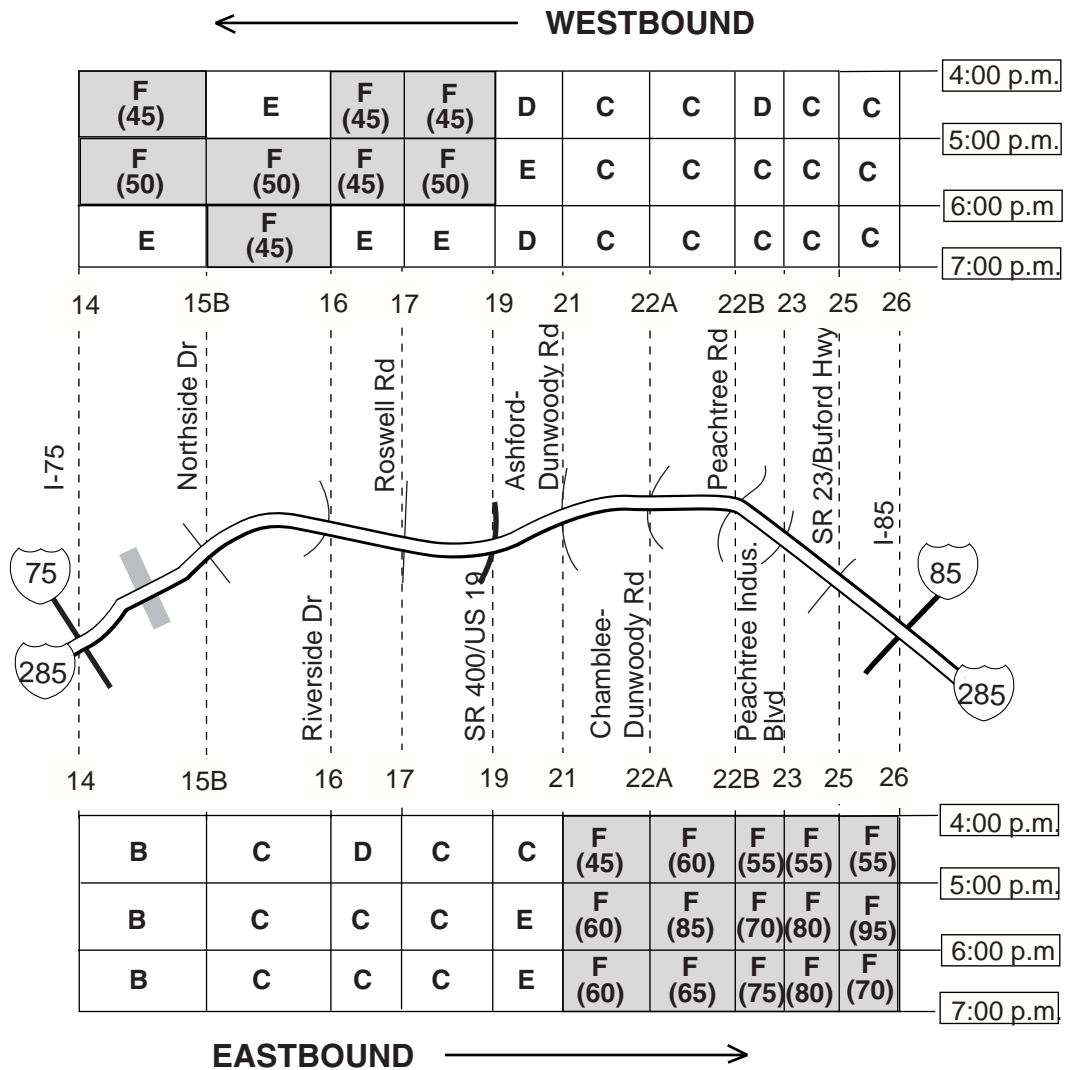
During most observations, moderate to severe southbound congestion was found on Ashford-Dunwoody Rd approaching the Perimeter interchange; in some cases, this congestion extended back through several upstream signals. This congestion was exacerbated by heavy traffic exiting the Perimeter Mall.

During most observations, westbound congestion was found on the Perimeter between SR 400 and I-75; the primary bottleneck was located where the roadway splits at the I-75 interchange (3 left lanes: Perimeter, 3 right lanes: I-75). Immediately after the split, the Perimeter drops one lane (3 lanes to 2); this lane drop and weaving on the approach to the split appeared to contribute to the congestion.

During most observations, congestion was found in each direction exiting the Perimeter to northbound SR 400; intermittently, these exit queues extended back into the right lane of the mainline on the Perimeter. These exit queues did not appear to affect thru-traffic on the Perimeter.



PERIMETER - NORTH (I-285) EVENING (FALL 1998)





SR 400 EVENING (FALL 1998)

During most observations before 6:30 p.m., minor northbound congestion (estimated speeds approx. 40-50 mph) was found on SR 400 between Haynes Bridge and State Bridge Rd. The lane drop (3 lanes to 2) north of Haynes Bridge Rd contributed to this slowing.

During most observations, the southbound exit ramp at Holcomb Bridge Rd was congested; vehicles queued in the left lane at the signal at the head of the ramp caused this exit queue. Intermittently, vehicles were queued on the shoulder of SR 400 waiting to exit.

During most observations after 5:00 p.m., the southbound exit ramp at Mansell Rd was congested (right lane only). The head of the queue was intermittently found at the head of the ramp and at the first signal west of the interchange; when congested, queue populations typically ranged from approximately 40-60 vehicles.

During most observations after 5:00 p.m., the southbound exit ramp at Northridge Rd was congested; in some cases, vehicles queued at the signal at the head of the ramp extended back onto the shoulder of SR 400. Signal queues were also typically found on most local street approaches to the interchange.

After 5:00 p.m., intermittent southbound congestion was found on SR 400 between Mansell and Holcomb Bridge Rd; traffic entering SR 400 from Mansell Rd and vehicles slowing to exit at Holcomb Bridge contributed to this congestion.

During most observations, eastbound congestion was found on Abernathy Rd approaching the signal at the SR 400 interchange; queue populations typically ranged from approximately 30-40 vehicles per lane (two lanes).

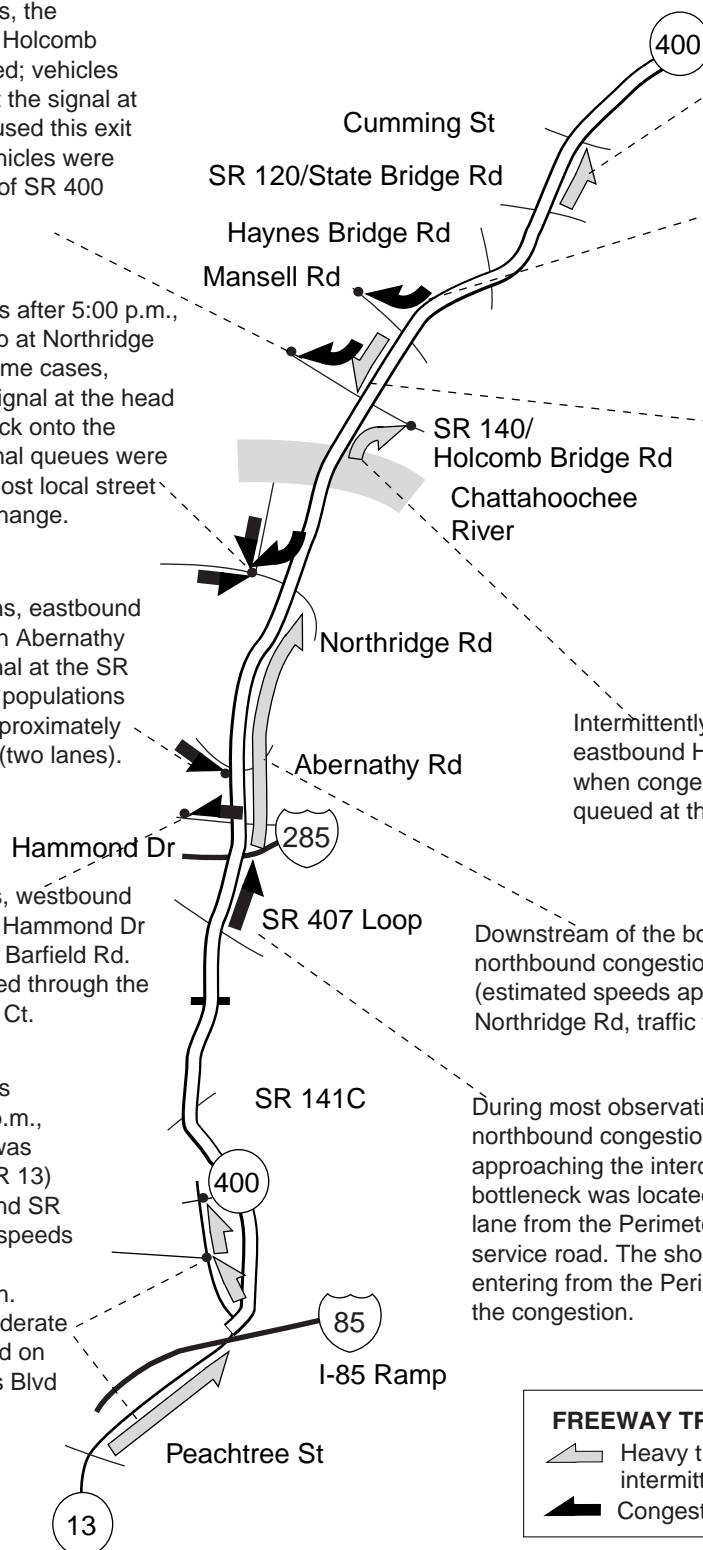
Intermittently, the northbound exit ramp to eastbound Holcomb Bridge Rd was congested; when congested approximately 20 vehicles were queued at the head of the ramp.

During most observations, westbound congestion was found on Hammond Dr approaching the signal at Barfield Rd. The queue typically backed through the upstream signal at Aruba Ct.

Downstream of the bottleneck at the Perimeter, northbound congestion on SR 400 gradually improved (estimated speeds approx. 40-50 mph). North of Northridge Rd, traffic typically resumed free flow speeds.

During most observations between 5:00 and 6:30 p.m., northbound congestion was found on Buford Hwy (SR 13) between Peachtree St and SR 400; average estimated speeds typically ranged from approximately 40-50 mph. Farther downstream, moderate signal queues were found on SR 13 at Sydney Marcus Blvd and Cheshire Bridge Rd.

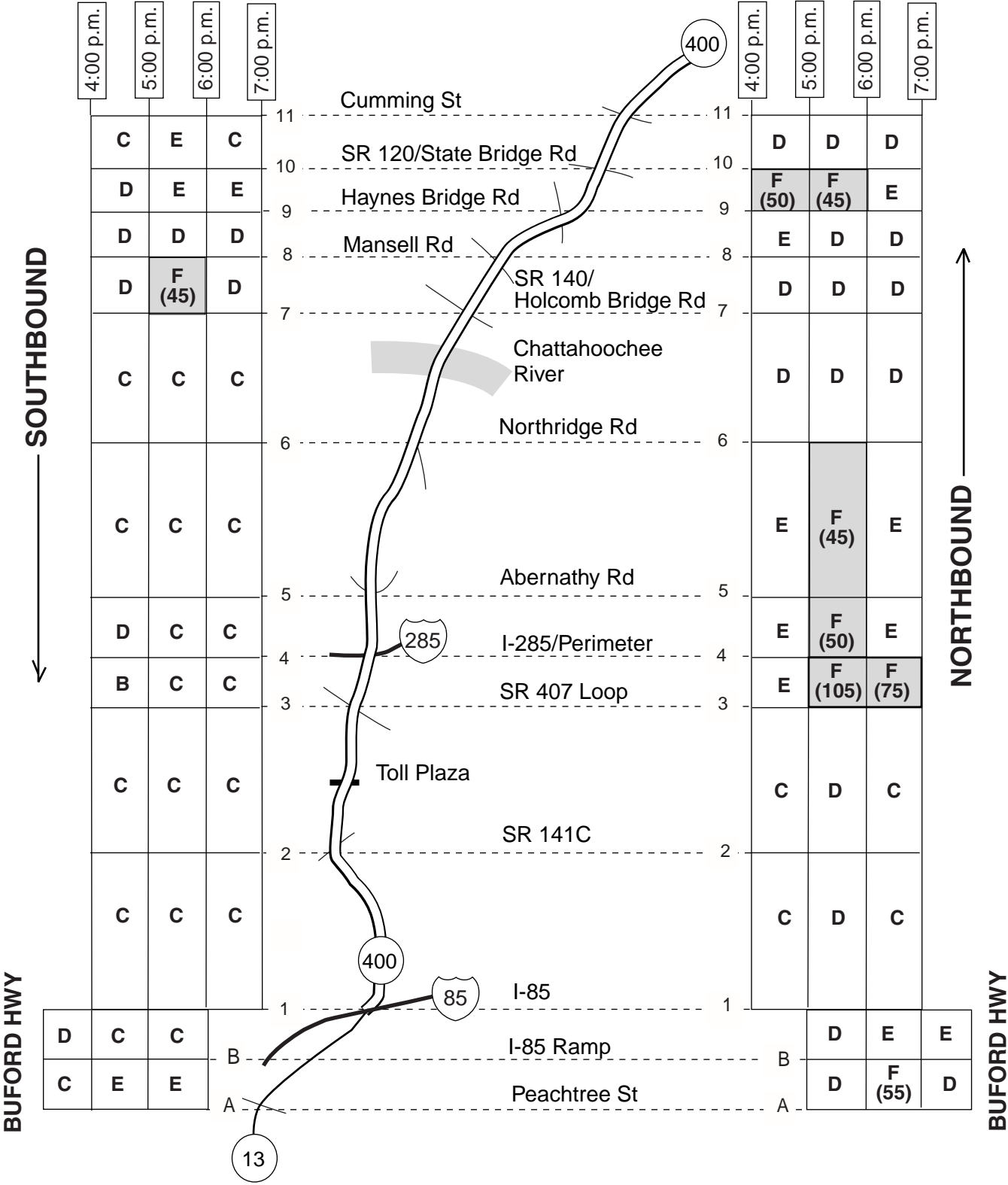
During most observations, a short zone of severe northbound congestion was found on SR 400 approaching the interchange at the Perimeter. The bottleneck was located where traffic entered the left lane from the Perimeter and the right lane from the service road. The short acceleration lane for traffic entering from the Perimeter appeared to exacerbate the congestion.



FREEWAY TRAFFIC QUALITY

- Heavy traffic flow or intermittent congestion
- Congested traffic flow

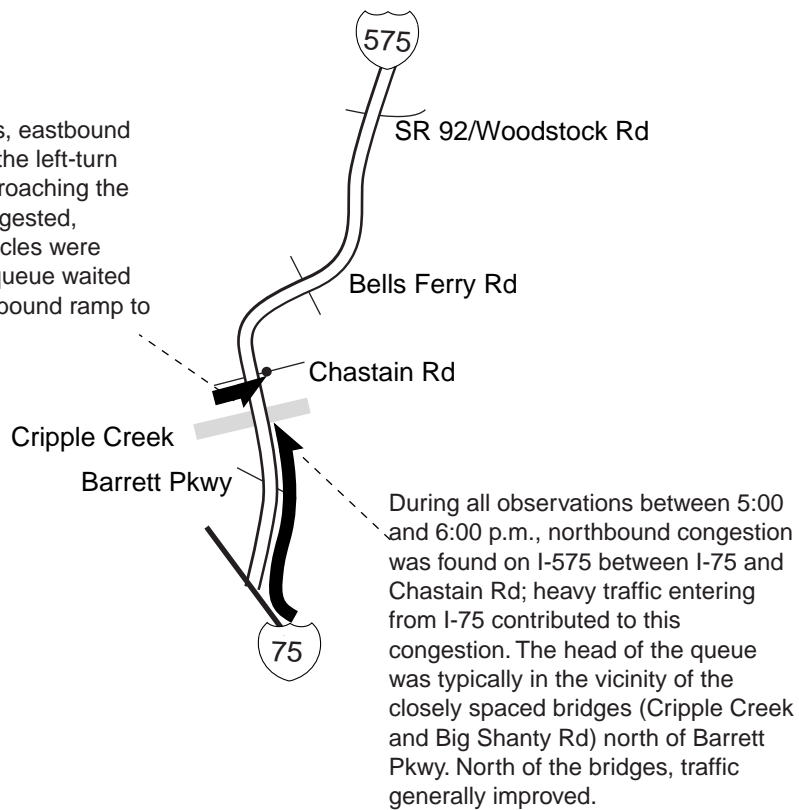
SR 400 EVENING (FALL 1998)



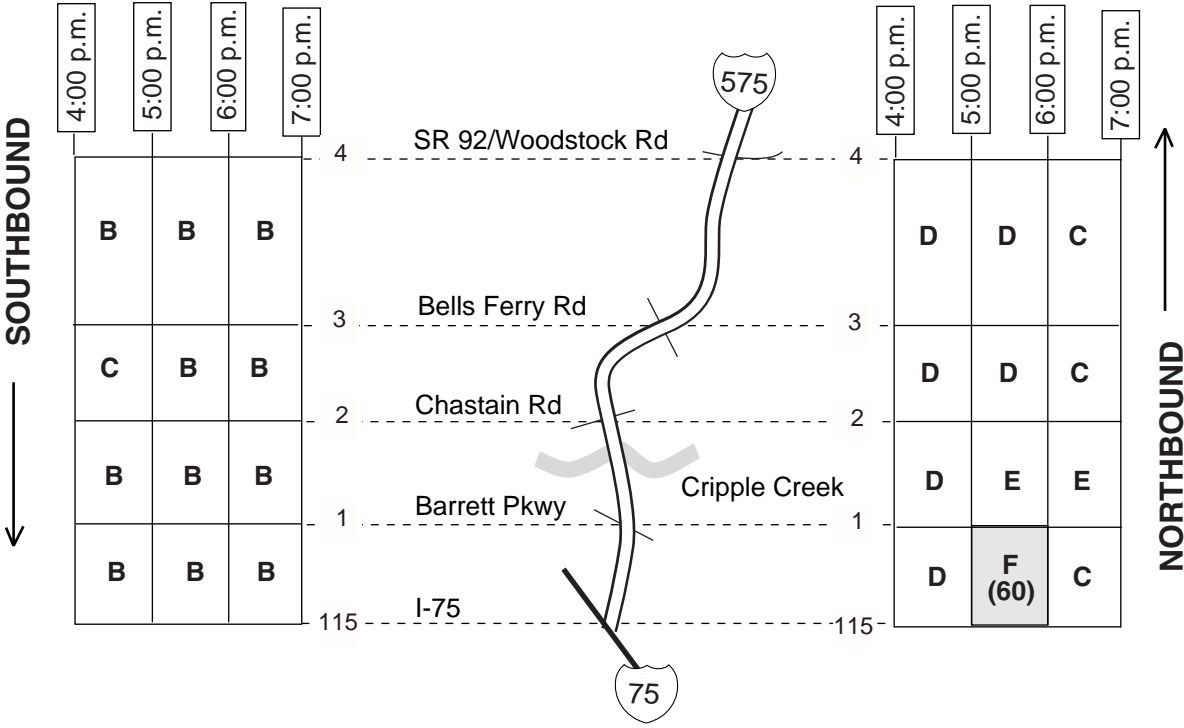


I-575 EVENING (FALL 1998)

During most observations, eastbound congestion was found in the left-turn lane on Chastain Rd approaching the signal at I-575; when congested, approximately 20-30 vehicles were queued. Vehicles in this queue waited to turn left onto the northbound ramp to I-575.

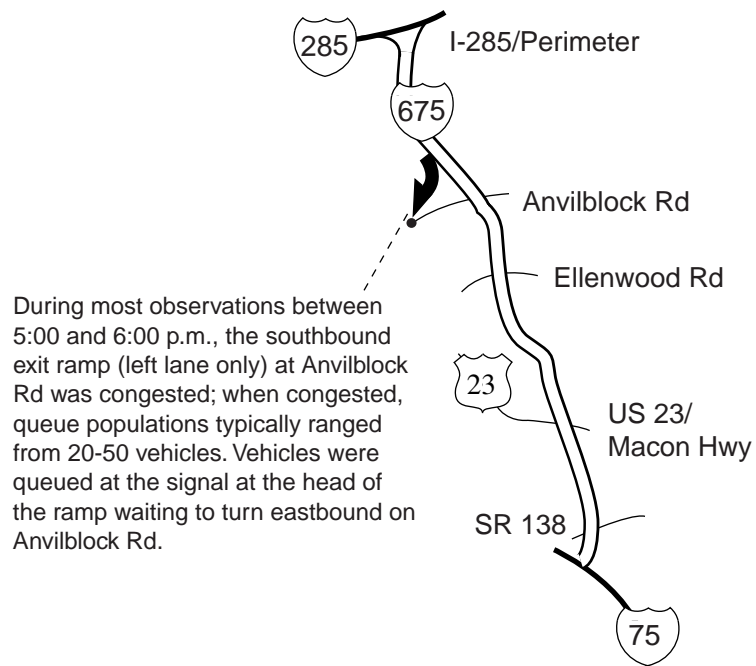


I-575
EVENING (FALL 1998)







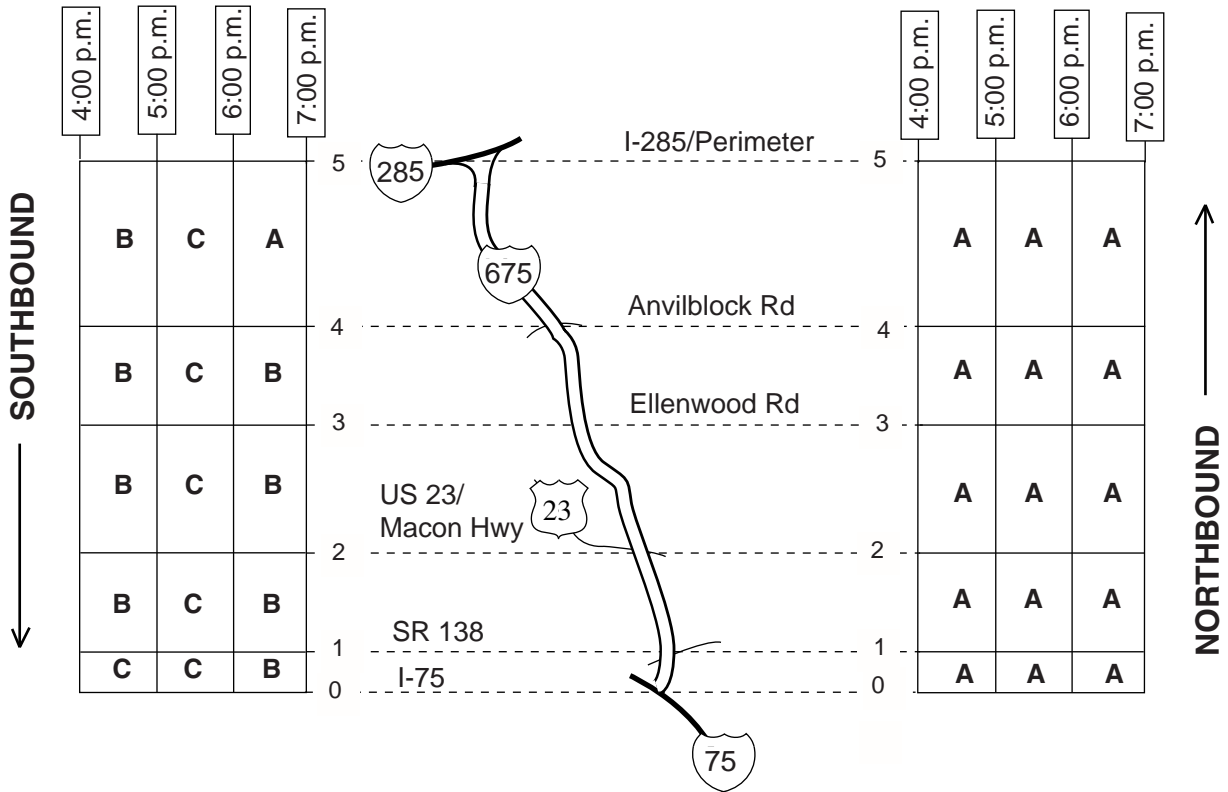
I-675 EVENING (FALL 1998)



FREEWAY TRAFFIC QUALITY

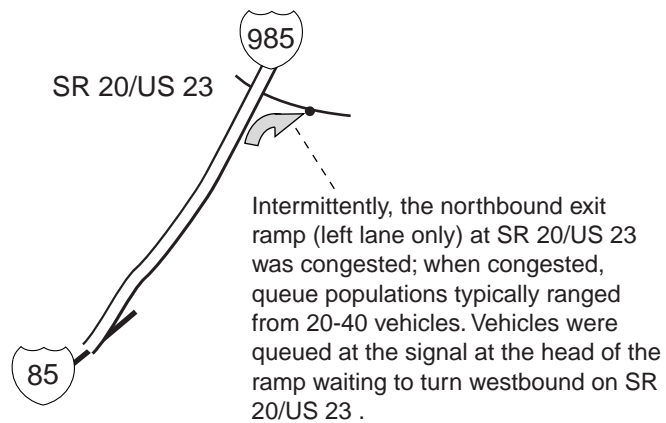
-  Heavy traffic flow or intermittent congestion
-  Congested traffic flow

I-675 EVENING (FALL 1998)







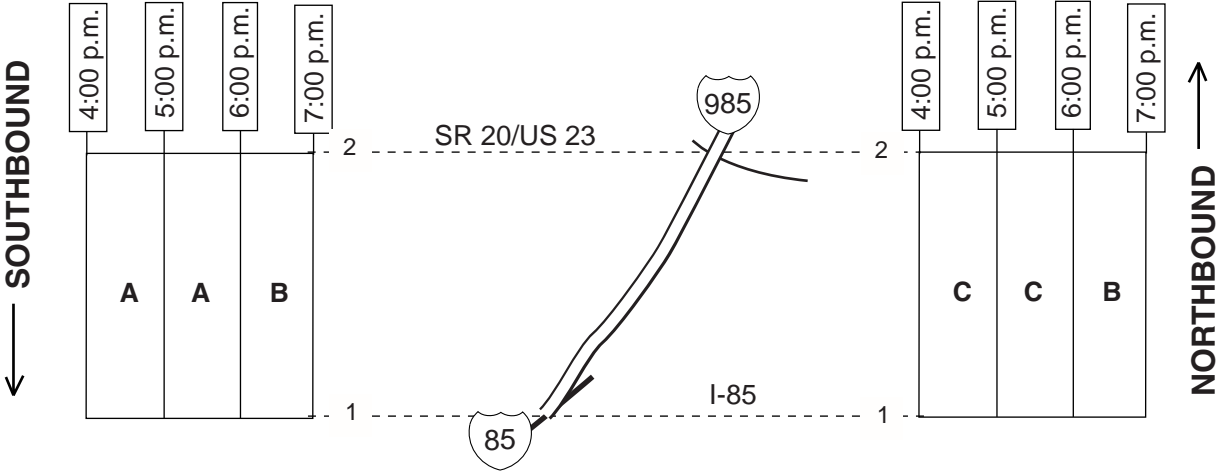
I-985 EVENING (FALL 1998)



FREEWAY TRAFFIC QUALITY

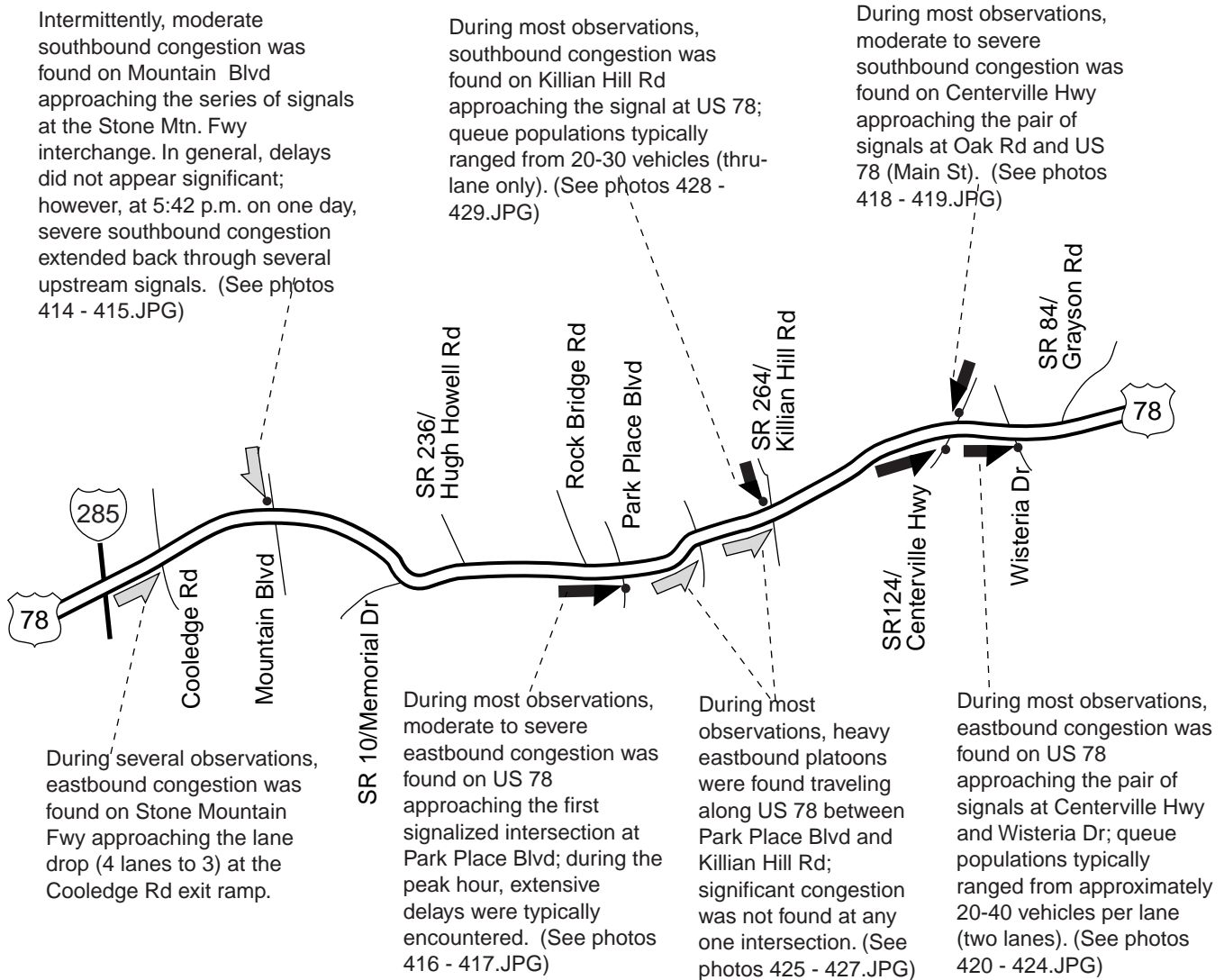
-  Heavy traffic flow or intermittent congestion
-  Congested traffic flow

I-985
EVENING (FALL 1998)





US 78 (STONE MOUNTAIN FWY) EVENING (FALL 1998)



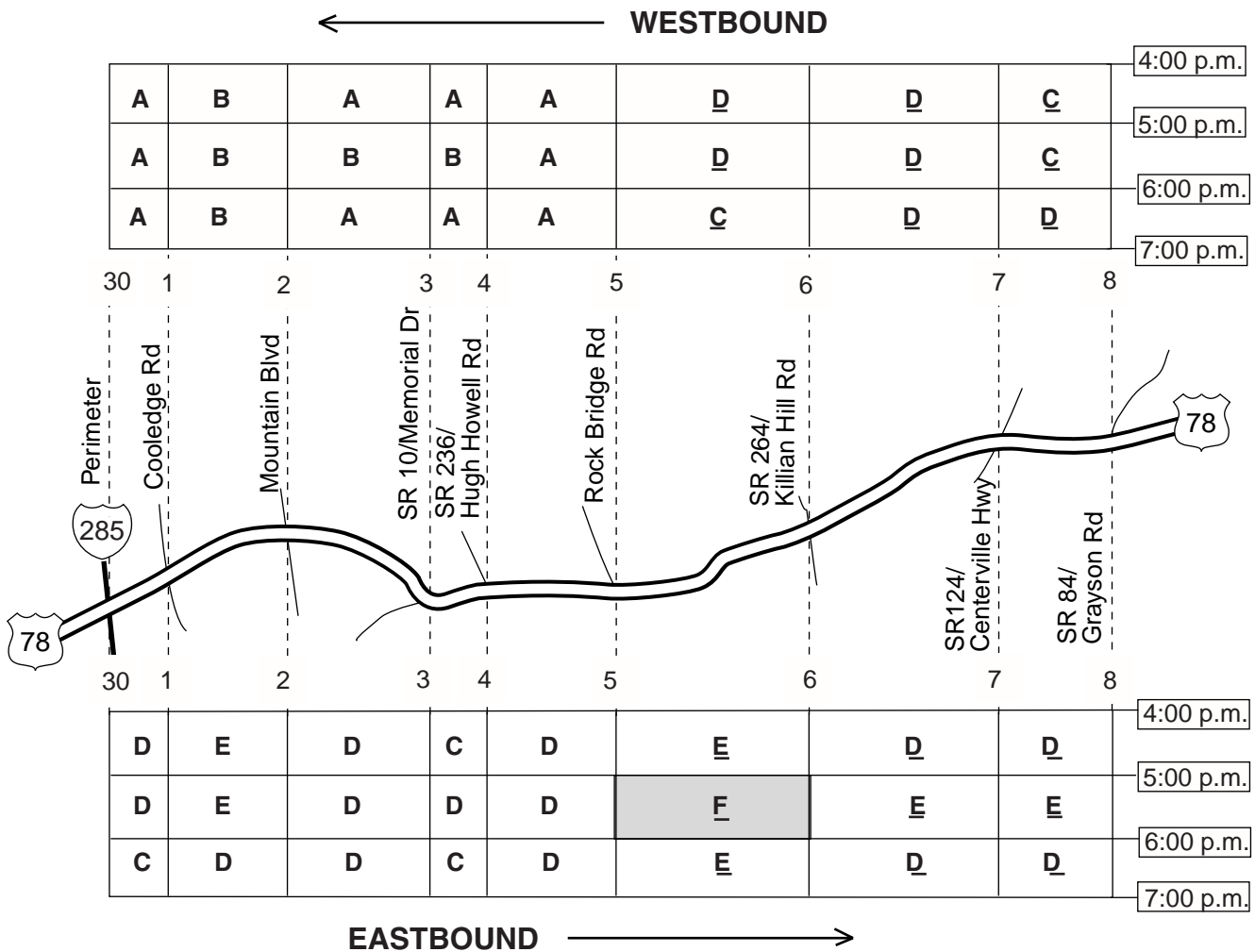
FREEWAY TRAFFIC QUALITY

- Heavy traffic flow or intermittent congestion
- Congested traffic flow

SIGNALIZED HIGHWAY TRAFFIC QUALITY

- Intermittent congestion or slow moving platoons along a highway segment
- Congested signalized intersection (intermittent)
- Congested signalized intersection (continuous)

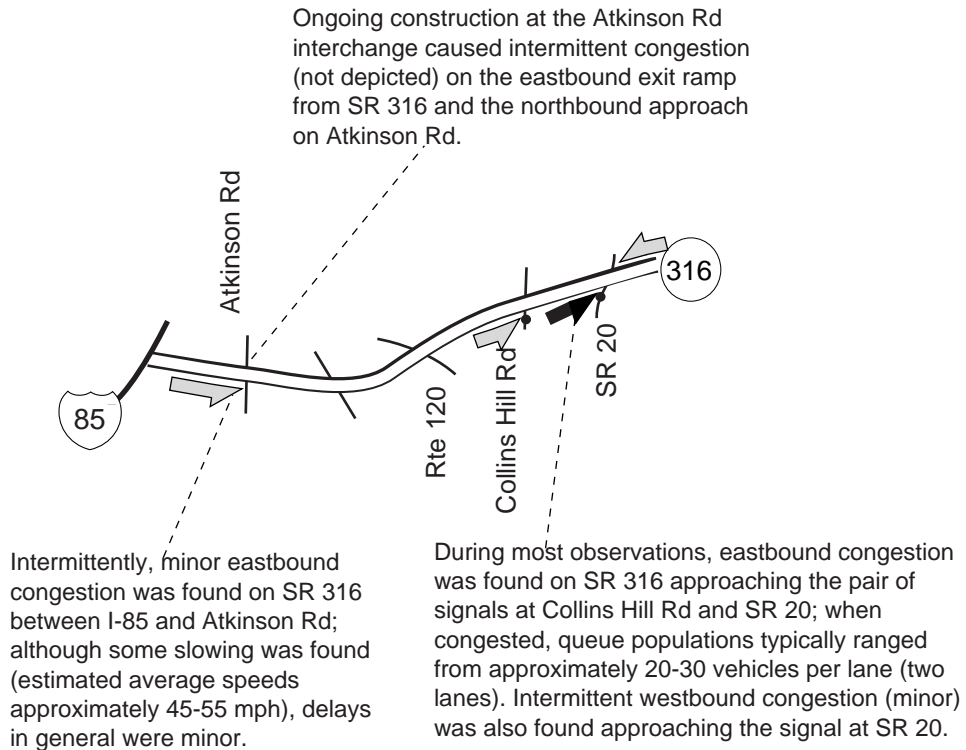
US 78 (STONE MOUNTAIN FWY) **EVENING (FALL 1998)**







SR 316 (Gwinnett County)




EVENING (FALL 1998)



FREEWAY TRAFFIC QUALITY

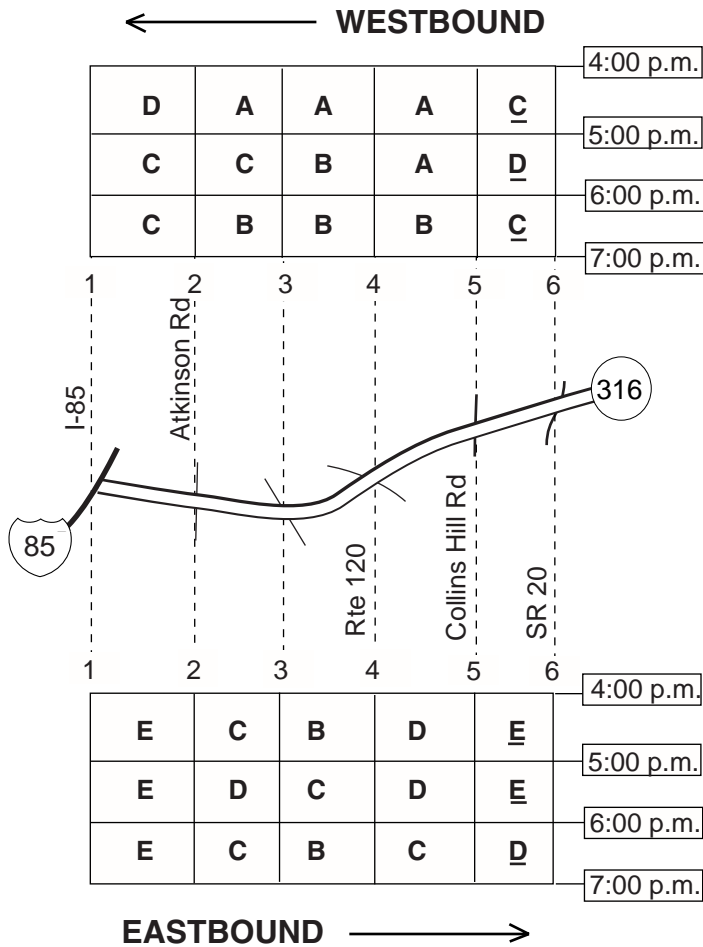
-  Heavy traffic flow or intermittent congestion
-  Congested traffic flow

SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

SR 316 **(Gwinnett County)**

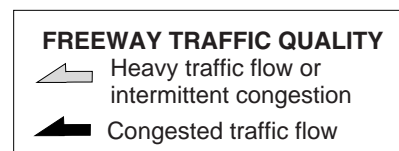
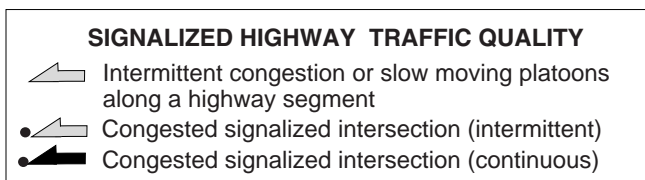
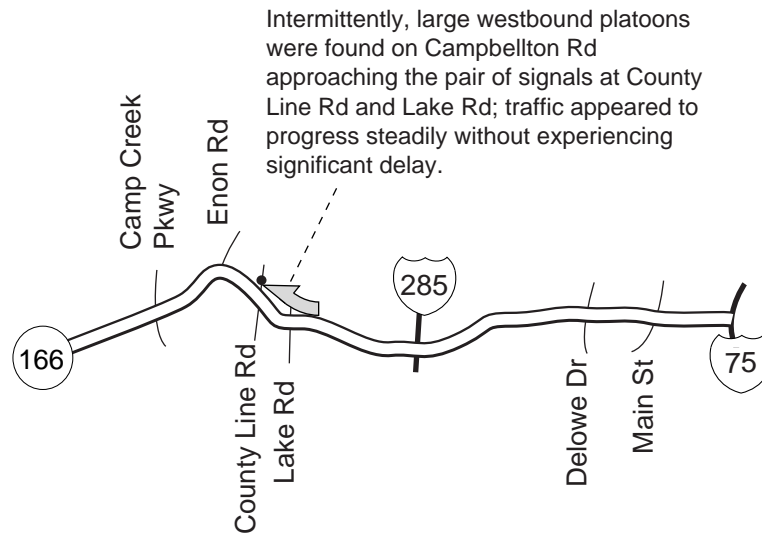
EVENING (FALL 1998)





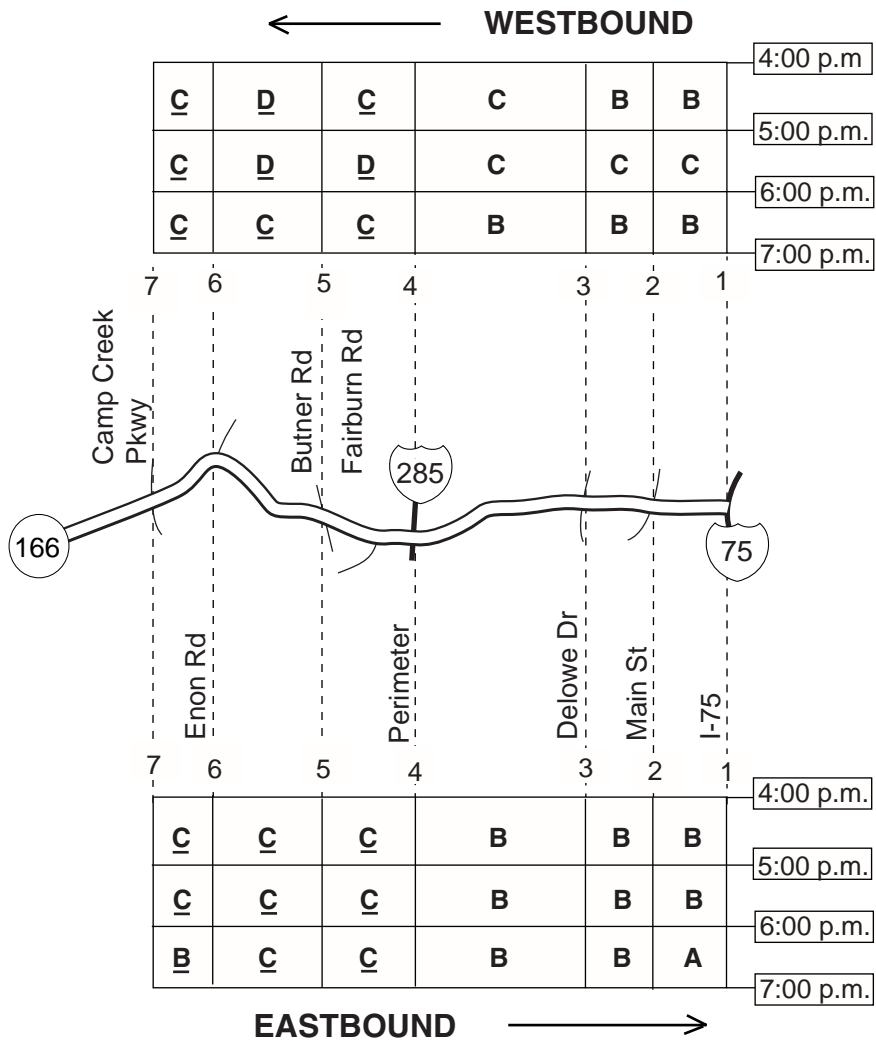
CAMPBELLTON RD / LAKEWOOD FWY (SR 166) (Fulton County)

EVENING (FALL 1998)



CAMPBELLTON RD / LAKEWOOD FWY (SR 166) (Fulton County)

EVENING (FALL 1998)





PEACHTREE IND. BLVD / MEDLOCK BRIDGE RD (SR 141) (Fulton / Gwinnett / Dekalb Co.)

EVENING (FALL 1998)

During most observations before 6:00 p.m., southbound congestion was found on Medlock Bridge Rd approaching the signal at Abbotts Bridge Rd; approximately 20-35 vehicles per lane were queued (two lanes). When congested, queuing in the left-turn bay typically extended back into the left lane of the mainline.

During most observations before 6:00 p.m., eastbound congestion was found on Old Alabama Rd approaching the signal at Medlock Bridge Rd; when congested, vehicles were queued in the left lane at the signal.

During most observations, moderate to severe northbound congestion was found at the SR 141 split approaching the signalized intersections at Holcomb Bridge Rd. Extensive queuing was found on both Peachtree Industrial Blvd and Peachtree Pkwy.

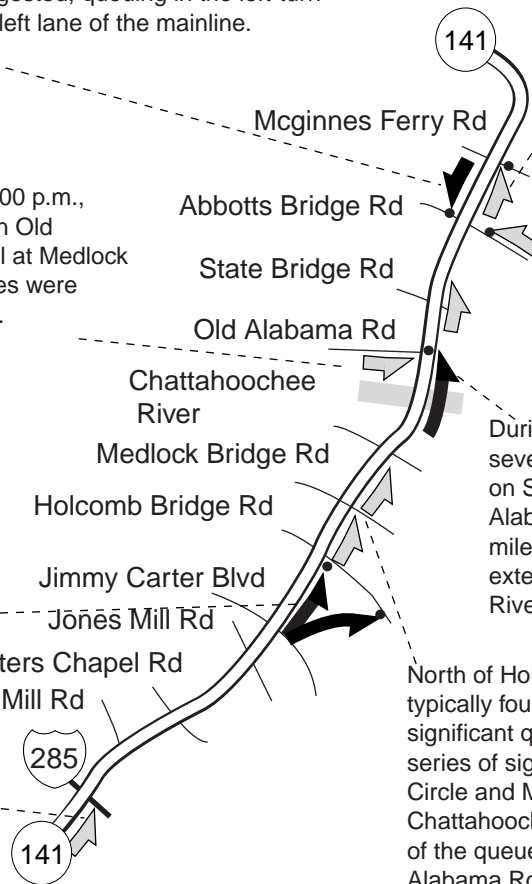
Intermittently, moderate northbound congestion was found on SR 141 approaching the signals at the Perimeter interchange.

During most observations before 6:00 p.m., large northbound platoons progressed steadily along Medlock Bridge Rd between the vicinity of State Bridge and McGinnes Ferry Rd. Intermittently, queuing was found at the signalized intersection at McGinnes Ferry Rd; when congested, queue populations typically ranged from 20-30 vehicles per lane (two lanes).




During the peak hour, westbound congestion was typically found on Abbotts Bridge Rd approaching the signal at Medlock Bridge Rd; the single lane queue populations were typically between 20-40 vehicles.

During most observations, moderate to severe northbound congestion was found on SR 141 approaching the signal at Old Alabama Rd; during the peak hour, a 1-2 mile zone of severe congestion typically extended back across the Chattahoochee River.



North of Holcomb Bridge Rd, large platoons were typically found traveling along Peachtree Pkwy; significant queues were intermittently found at the series of signals (Spalding Dr, Peachtree Corners Circle and Medlock Bridge Rd) leading up to the Chattahoochee River. During the peak hour, the tail of the queue from the downstream bottleneck at Old Alabama Rd was typically encountered in the vicinity of the river crossing.



SIGNALIZED HIGHWAY TRAFFIC QUALITY

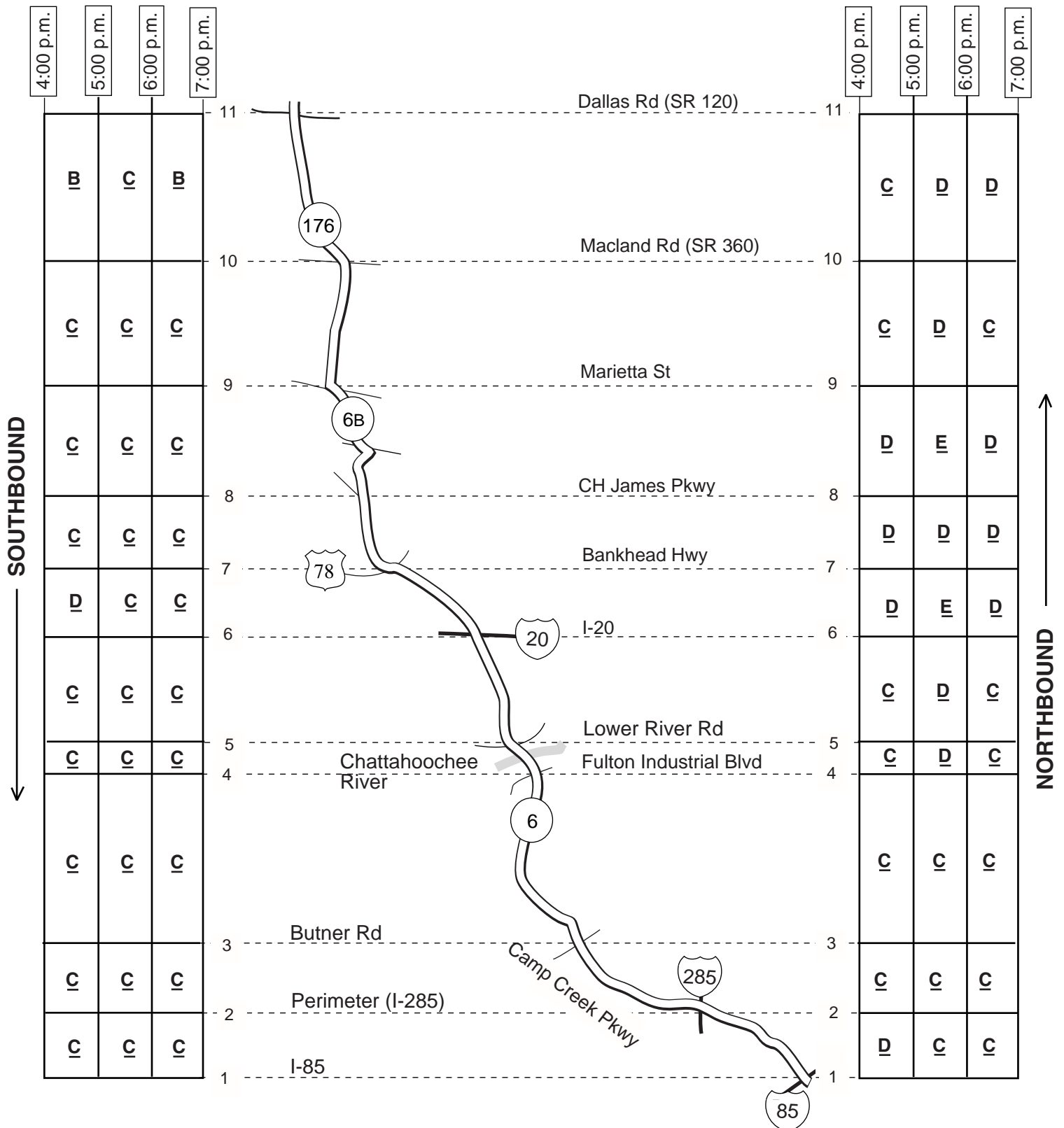
-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

FREEWAY TRAFFIC QUALITY

-  Heavy traffic flow or intermittent congestion
-  Congested traffic flow

SR 176 / SR 6 / CAMP CREEK PKWY (Cobb / Douglas / Fulton Co.)

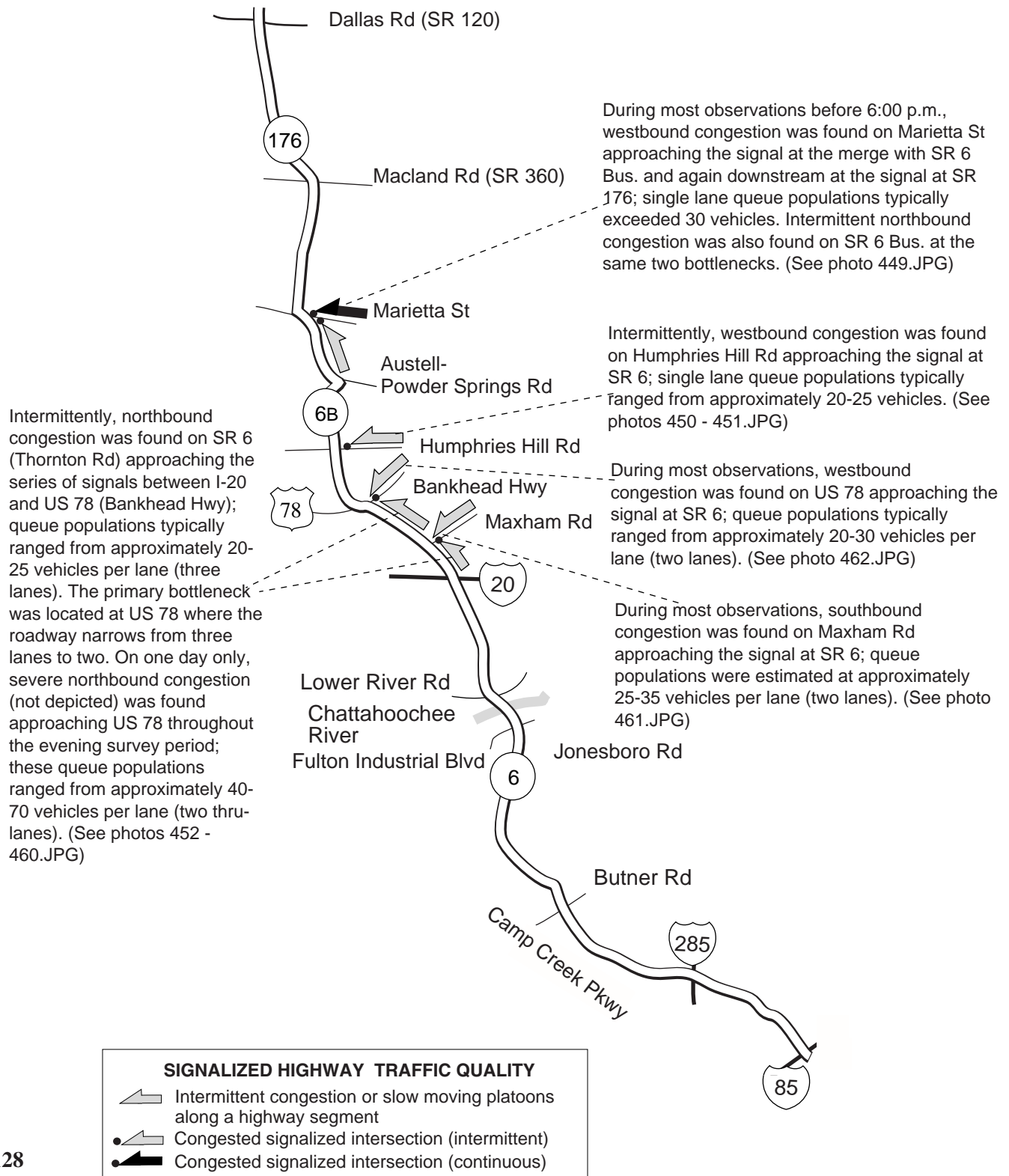
EVENING (FALL 1998)





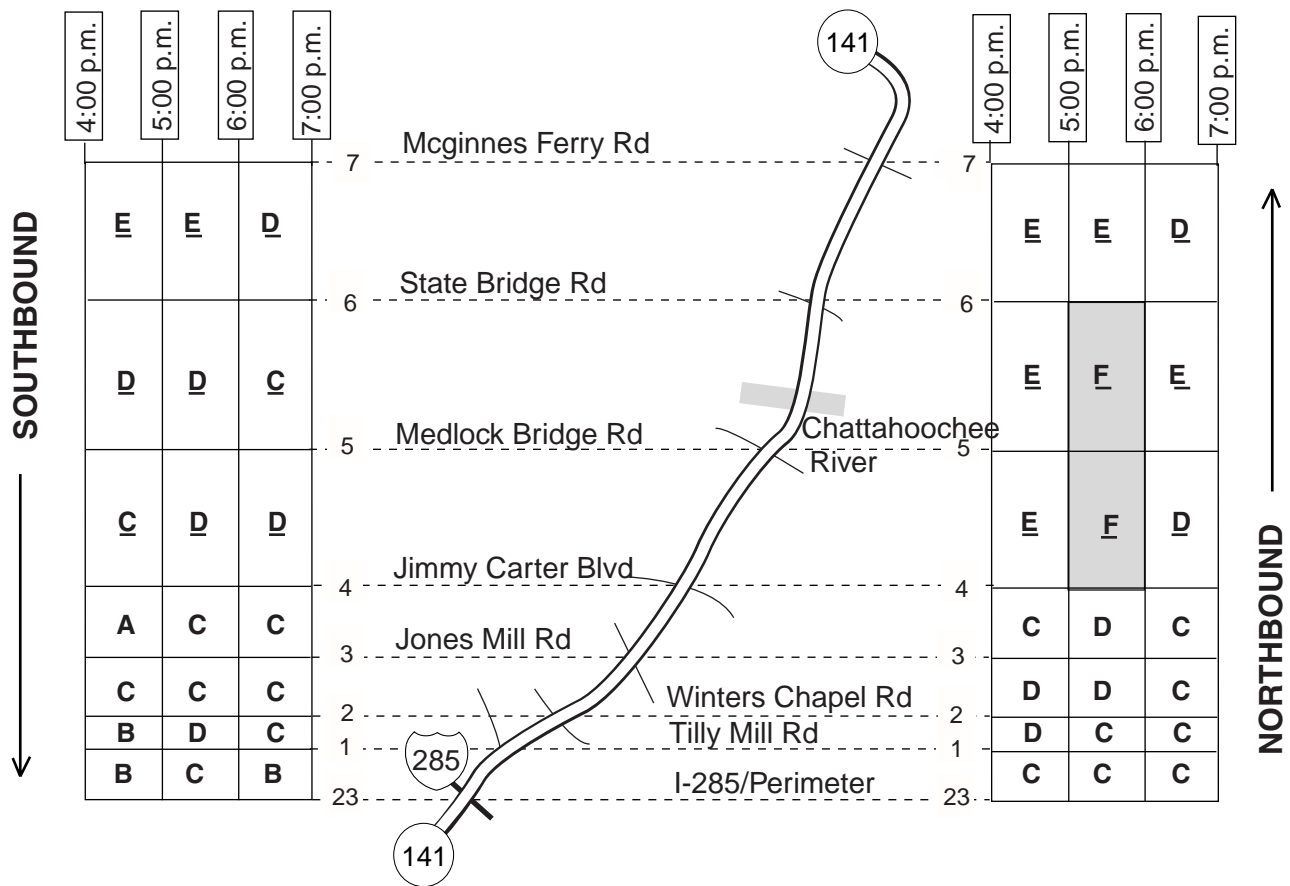
SR 176 / SR 6 / CAMP CREEK PKWY (Cobb / Douglas / Fulton Co.)

EVENING (FALL 1998)



PEACHTREE IND. BLVD / MEDLOCK BRIDGE RD (SR 141)
(Fulton / Gwinnett / Dekalb Co.)

EVENING (FALL 1998)





US 41 / 19 (TARA BLVD) (Clayton County)

EVENING (FALL 1998)

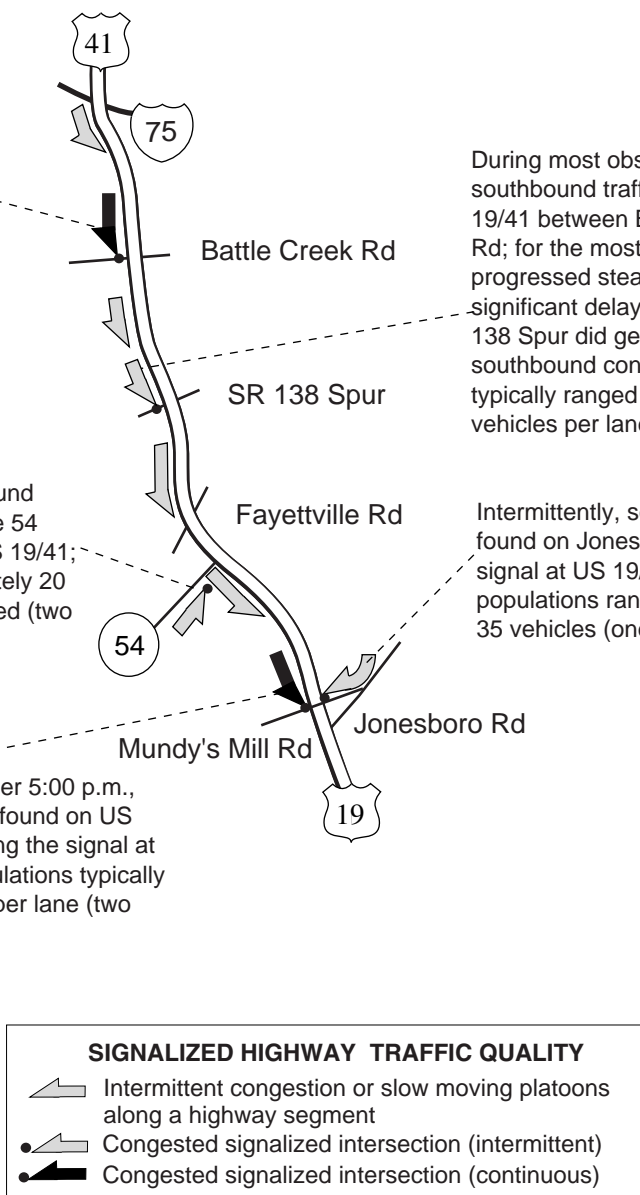
During most observations before 6:00 p.m., heavy southbound traffic flow was found on US 19/41 between I-75 and Battle Creek Rd; traffic typically progressed steadily without experiencing significant delay up until the signal at Battle Creek. Queue populations at this signal typically ranged from approximately 20-40 vehicles per lane (three lanes).

Intermittently, minor northbound congestion was found on Rte 54 approaching the signal at US 19/41; when congested, approximately 20 vehicles per lane were queued (two lanes).

During most observations after 5:00 p.m., southbound congestion was found on US 19/41 (Tara Blvd) approaching the signal at Mundy's Mill Rd; queue populations typically ranged from 20-40 vehicles per lane (two lanes).

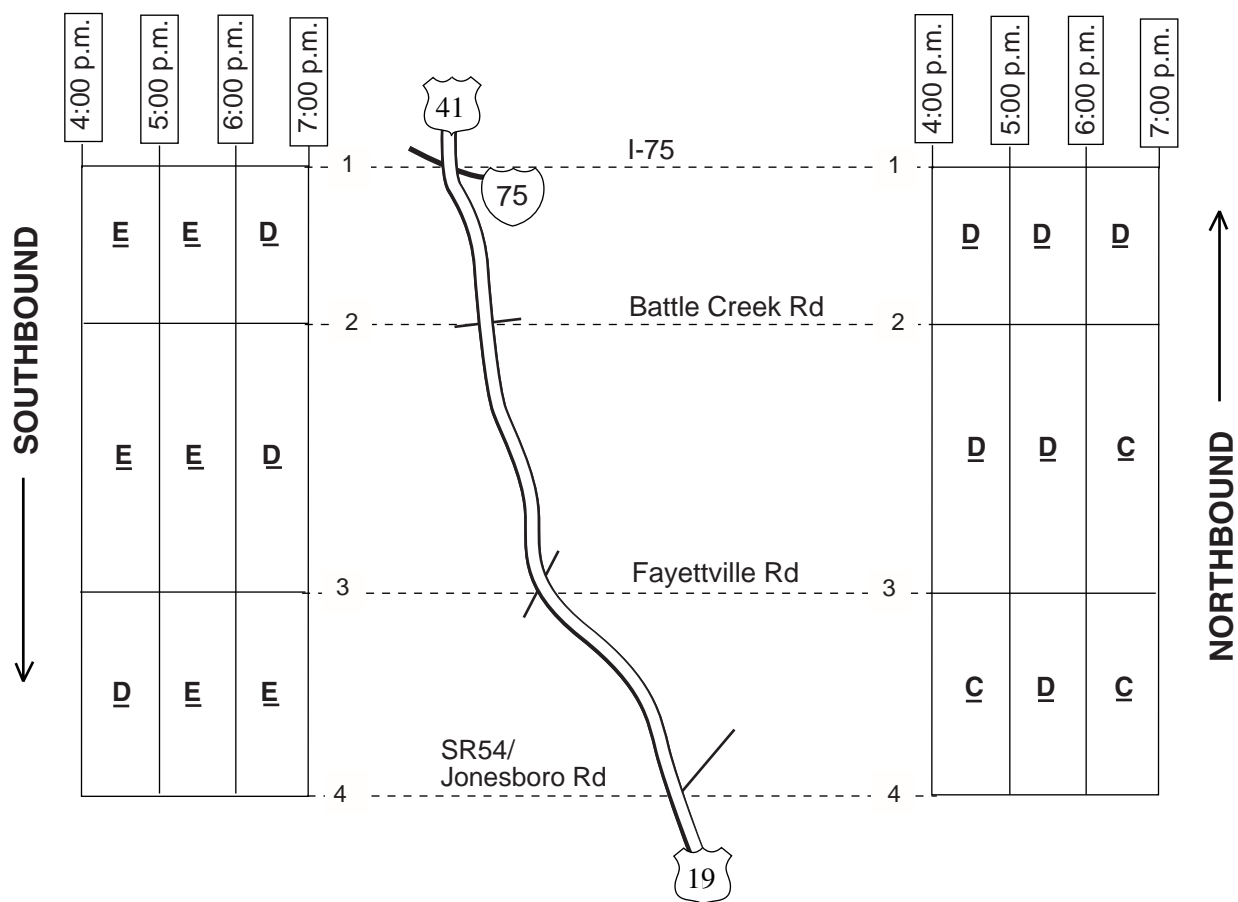
During most observations, heavy southbound traffic flow was found on US 19/41 between Battle Creek and Fayetteville Rd; for the most part, it appeared traffic progressed steadily without experiencing significant delay. However, the signal at SR 138 Spur did generate intermittent southbound congestion; queue populations typically ranged from approximately 20-30 vehicles per lane (three lanes).

Intermittently, southbound congestion was found on Jonesboro Rd approaching the signal at US 19/41; when congested, queue populations ranged from approximately 20-35 vehicles (one lane).



US 41 / 19 (TARA BLVD)
(Clayton County)

EVENING (FALL 1998)



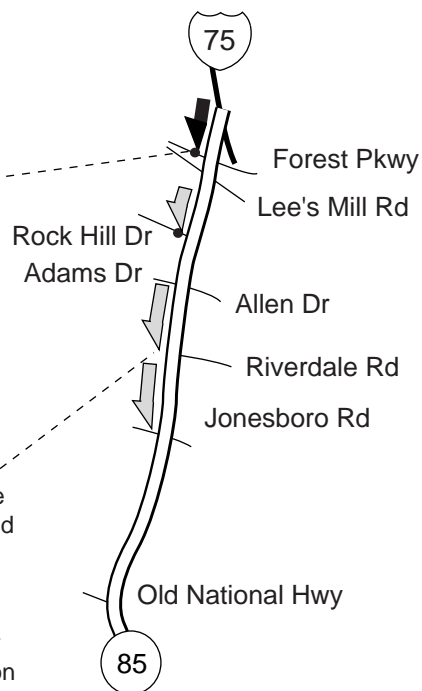


SR 85 (Clayton County)




EVENING (FALL 1998)

During most observations, southbound congestion was found on SR 85 between I-75 and Jonesboro Rd; traffic exiting I-75 onto SR 85 typically encountered a significant queue at the first signal at Forest Pkwy. South of Forest Pkwy, intermittent southbound congestion was found at the signal at Rock Hill Dr.

During most observations, large southbound platoons were found traveling along SR 85 between Adams Dr and Jonesboro Rd; although some delays were apparent, locations consistently generating significant congestion were not found.



SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

SR 85 (Clayton County)

EVENING (FALL 1998)





ALPHARETTA / STATE BRIDGE / PLEASANT HILL RD (SR 120) (Fulton / Gwinnett Co.)

EVENING (FALL 1998)

During most observations, westbound congestion was found on Alpharetta Hwy approaching the series of signals between Hembree Rd and SR 92 (Crossville Rd); the primary bottlenecks appeared to be the signals at Hembree Rd, Mansell Rd and SR 92. In some cases, the queue at SR 92 extended back through several upstream signals.

Intermittently, eastbound congestion was found on Alpharetta Hwy approaching the signal at SR 92; when congested, queue populations typically ranged from approximately 20-30 vehicles per lane (two lanes).

Intermittently, eastbound congestion was found on S. Main St approaching the signal at Maddox St; when congested, queue populations ranged from approximately 20-30 vehicles per lane (two lanes).

During most observations, severe eastbound congestion was found on State Bridge Rd approaching the signals where the roadway divides at State / Kimball Bridge Way; this congestion was exacerbated by a lane drop (2 lanes to 1) and ongoing construction in this vicinity. Intermittent congestion was also found on the other two approaches.

During most observations between 5:00 and 6:00 p.m., westbound congestion was found on State Bridge Rd approaching the signal at Jones Bridge Rd; when congested, long single lane queue populations ranged from approximately 30-50 vehicles.

Intermittently, northbound congestion was found on Peachtree Industrial Blvd approaching the signal at Pleasant Hill Rd; when congested, queue populations typically ranged from approximately 20-40 vehicles per lane (two lanes).

During most observations, northbound congestion was found on Buford Hwy approaching the signal at Pleasant Hill Rd; the maximum observed queue population was approximately 40 vehicles per lane (two lanes).




Intermittently, southbound congestion was found on Medlock Bridge Rd approaching the signal at State Bridge Rd; when congested, queue populations typically ranged from approximately 20-30 vehicles per lane (two lanes). In some cases, vehicles queued in the left-turn bay at the signal extended back into the left lane of Medlock Bridge Rd.

Intermittently, northbound congestion was found on Pleasant Hill Rd approaching the signal at Peachtree Industrial Blvd; when congested, queue populations typically ranged from approximately 20-30 vehicles per lane (two lanes).

During most observations, moderate to severe congestion was found in each direction on Pleasant Hill Rd approaching the signal at Buford Hwy. In addition to the signal, intermittent blockage of the roadway at the train tracks (Norfolk Southern Railway) exacerbated the congestion. Vehicles were intermittently queued at the signal (Buford Hwy) and the train tracks. Extensive delays were normally encountered by southbound travelers at this location.

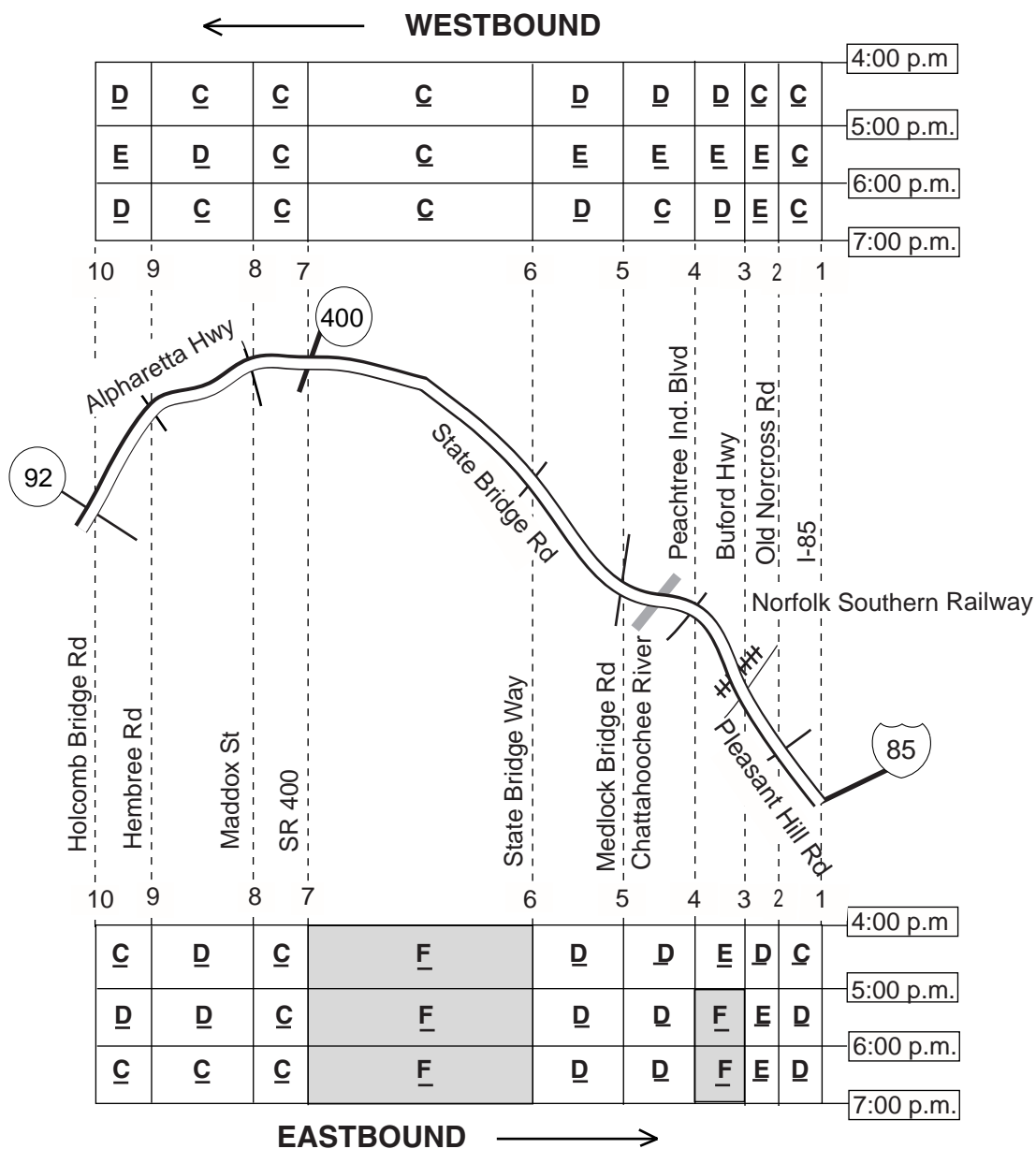
During most observations after 5:00 p.m., southbound congestion was found on Pleasant Hill Rd approaching the signal at Old Norcross Rd; traffic appeared to progress steadily through this intersection without experiencing significant delay.

SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

ALPHARETTA / STATE BRIDGE / PLEASANT HILL RD (SR 120) (Fulton / Gwinnett Co.)

EVENING (FALL 1998)



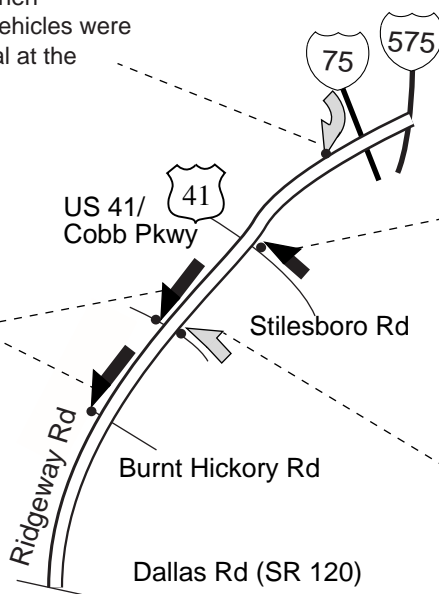


RIDGEWAY RD / BARRETT PKWY (Cobb County)

EVENING (FALL 1998)

Intermittently, the I-75 southbound exit ramp at Barrett Pkwy was congested; when congested, approximately 20-40 vehicles were queued in the left lane at the signal at the head of the ramp.




During most observations before 6:00 p.m., southbound congestion was found on Barrett Pkwy approaching the pair of signals at Stilesboro and Burnt Hickory Rd; queue populations varied widely from approximately 20-50 vehicles per lane.



During most observations before 6:00 p.m., northbound congestion was found on Cobb Pkwy approaching the signal at Barrett Pkwy; queue populations ranged from approximately 20-40 vehicles per lane.

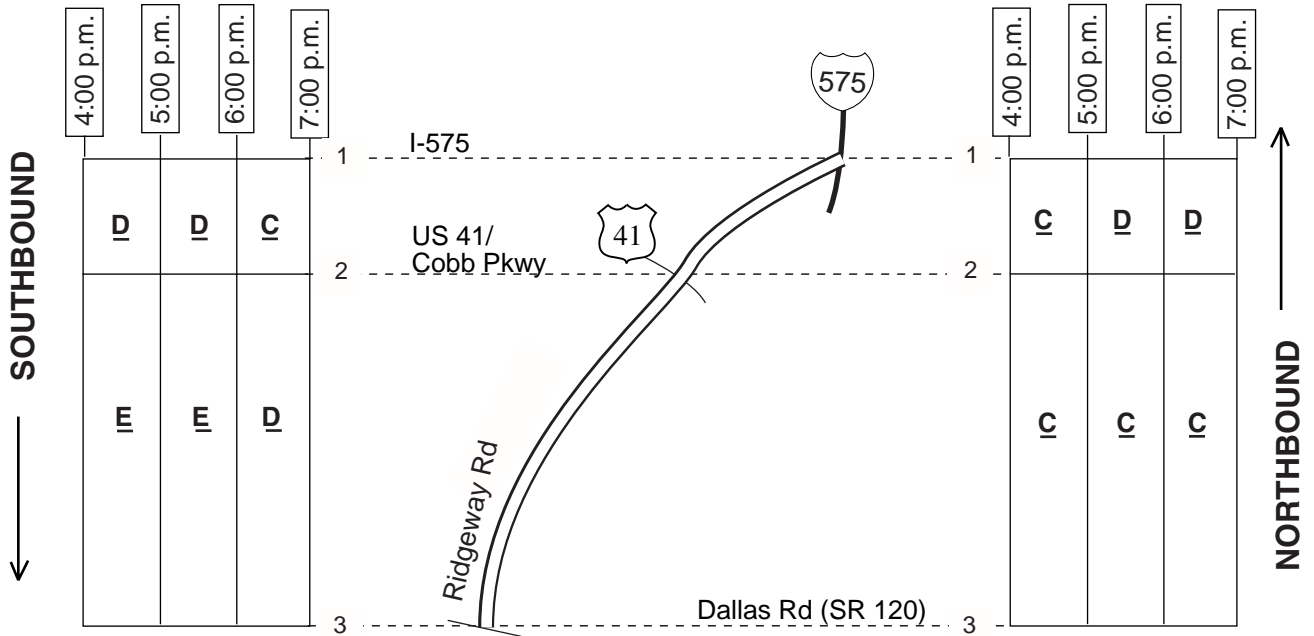
Intermittently, westbound congestion was found on Stilesboro Rd approaching the signal at Barrett Pkwy; when congested, queue populations ranged from approximately 20-40 vehicles (one lane).

SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

BARRETT PKWY / RIDGEWAY RD **(Cobb County)**

EVENING (FALL 1998)



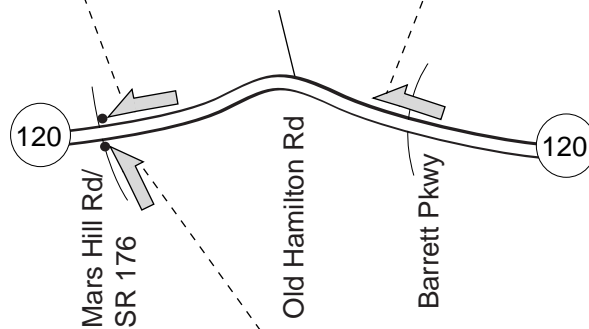


DALLAS RD (SR 120) (Cobb County)

EVENING (FALL 1998)




Intermittently, minor westbound congestion was found on Dallas Rd (SR 120) approaching the signal at Mars Hill Rd (SR 176); when congested, queue populations typically ranged from 20-25 vehicles per lane (two lanes).

Before 6:00 p.m., large westbound platoons typically progressed steadily on Dallas Rd in the vicinity of Barrett Pkwy. However, unlike in the morning, large queues were not observed at this signal and delays appeared to be relatively minor. The maximum observed queue contained approximately 25 vehicles per lane (two lanes).



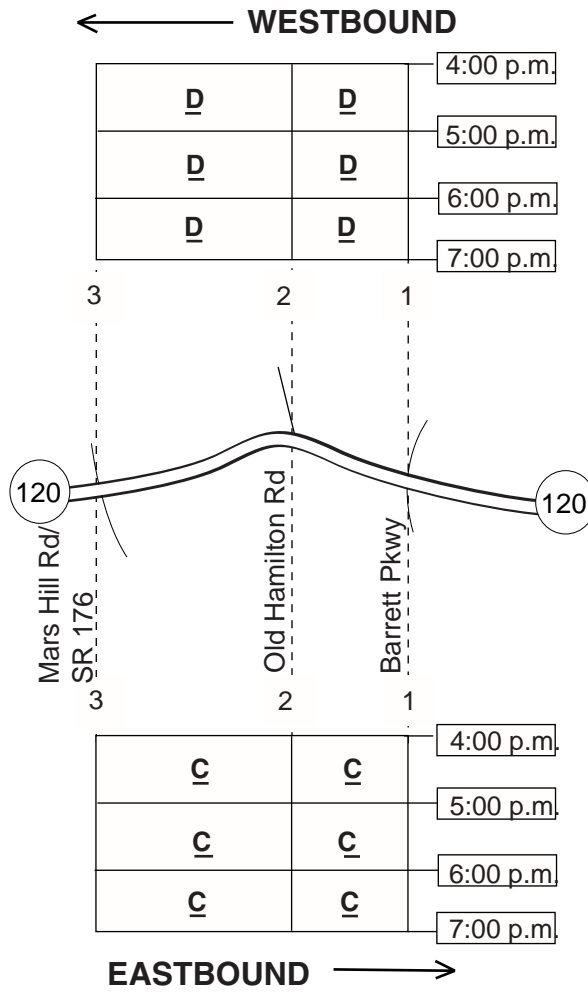
Before 6:00 p.m., intermittent northbound congestion was found on Mars Hill Rd approaching the signal at Dallas Rd; when congested, the single lane queue population typically ranged from approximately 20-30 vehicles.

SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

DALLAS RD (SR 120) (Cobb County)

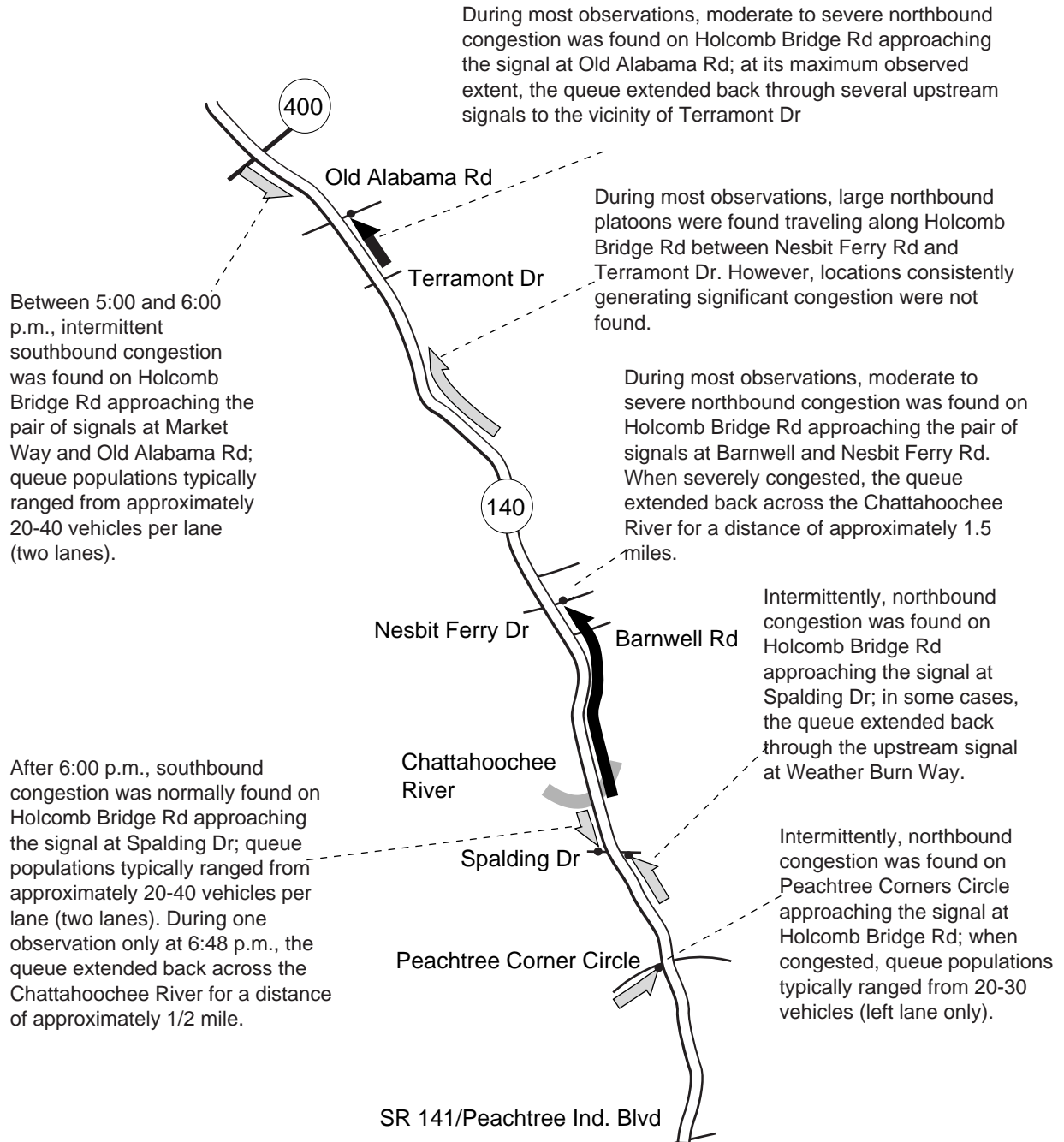
EVENING (FALL 1998)








HOLCOMB BRIDGE RD (SR 140) (Gwinnett / Fulton Co.)

EVENING (FALL 1998)

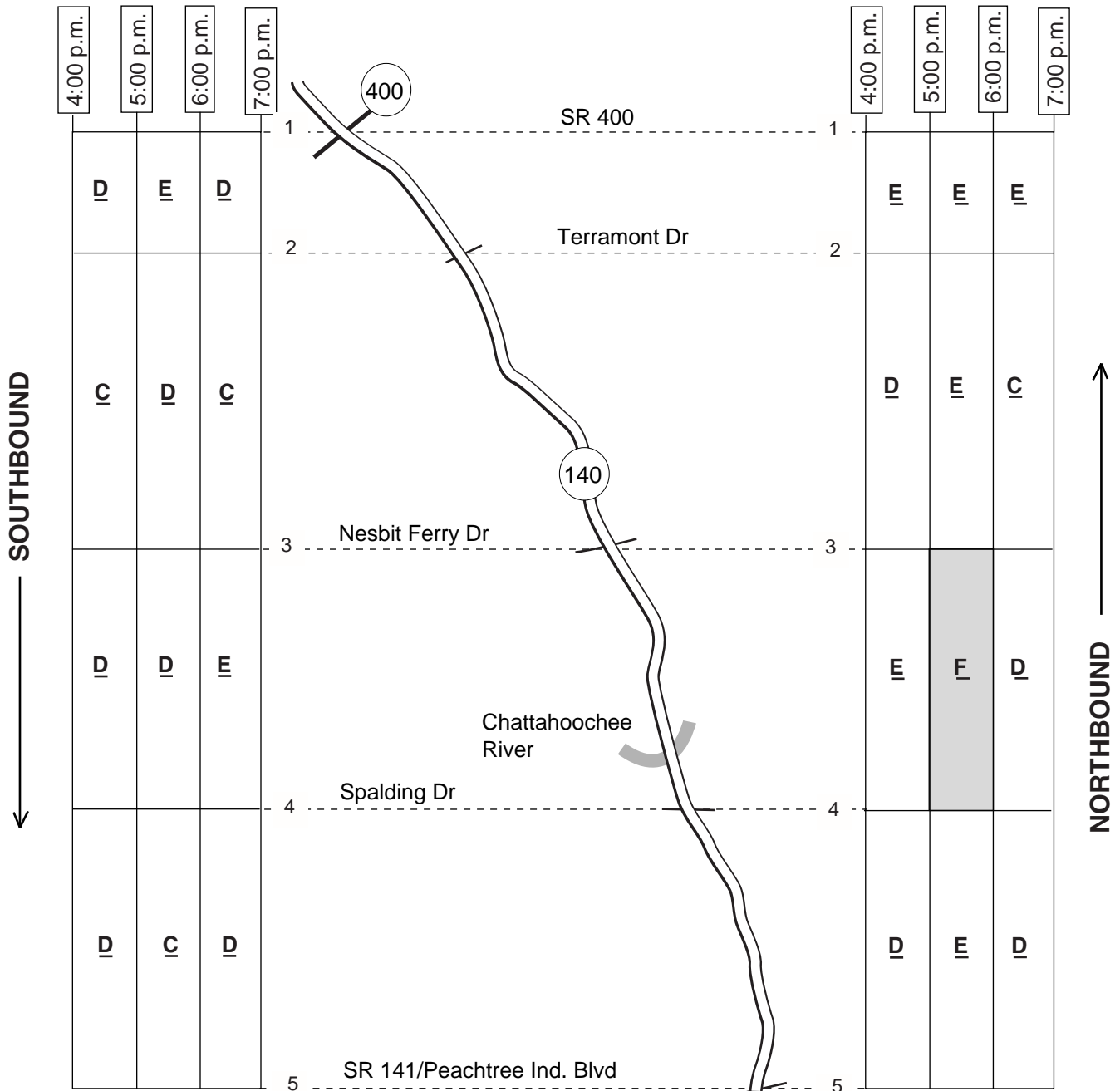


SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

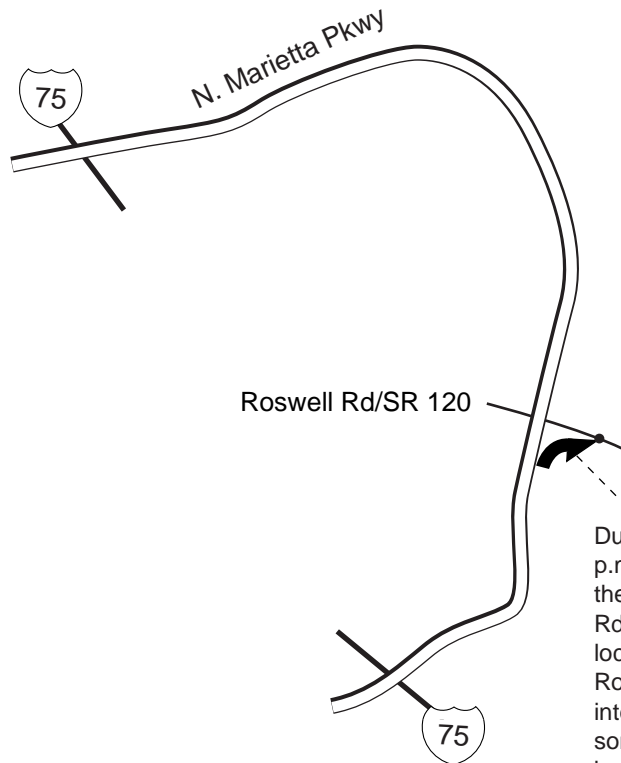
HOLCOMB BRIDGE RD (SR 140) (Gwinnett / Fulton Co.)

EVENING (FALL 1998)








**MARIETTA PKWY
(Cobb County)
EVENING (FALL 1998)**



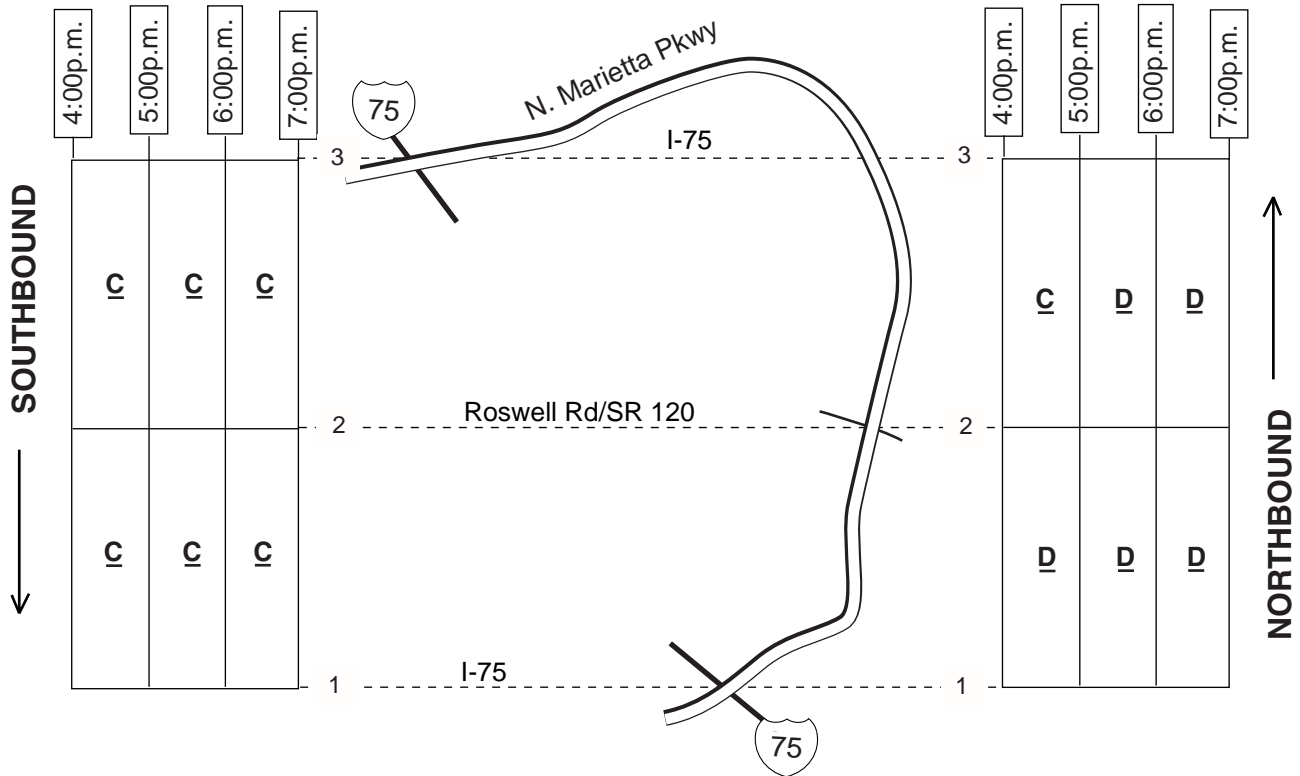
During most observations after 5:00 p.m., extensive queuing was found on the northbound exit ramp at Roswell Rd; the head of this queue was located downstream (eastbound) on Roswell Rd at the signalized intersection at Greenbriar Pkwy. In some cases the exit queue extended back into the mainline of Marietta Pkwy; thru-traffic on Marietta Pkwy was not affected by this queue.

SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

**MARIETTA PKWY
(Cobb County)**

EVENING (FALL 1998)





SR 92 (CROSSVILLE / WOODSTOCK /ALABAMA RD) **(Cherokee / Fulton Co.)** **EVENING (FALL 1998)**

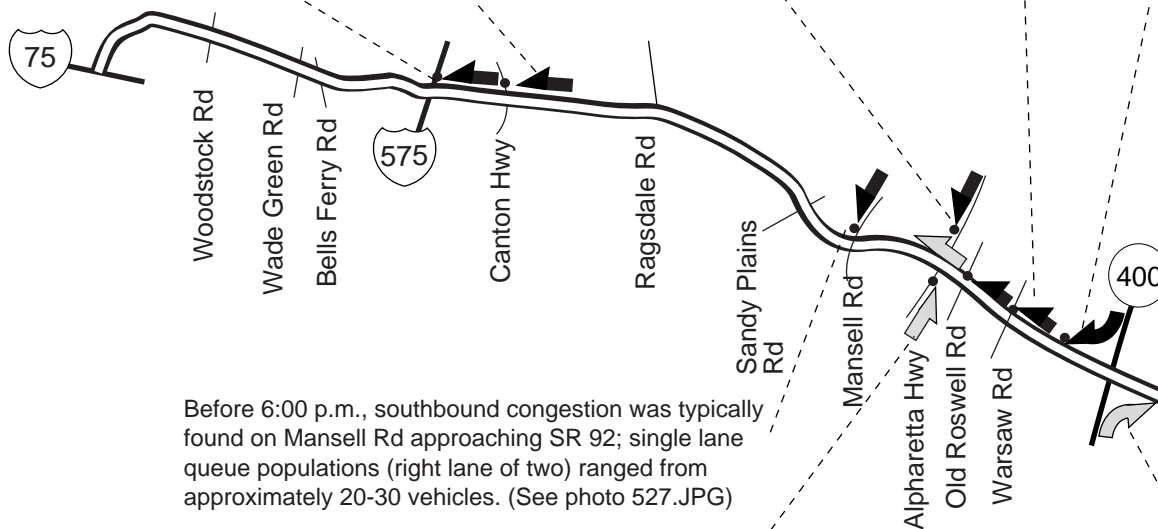
Before 6:00 p.m., westbound congestion was typically found on SR 92 approaching the pair of signals at I-575; queue populations at these signals ranged from approximately 20-30 vehicles per lane (two lanes). (See photos 523 - 524.JPG)

During most observations before 6:00 p.m., westbound congestion was found on SR 92 approaching the signal at Canton Hwy; queue populations varied widely from approximately 20-50 vehicles per lane. (See photos 525 - 526.JPG)

During most observations, significant westbound congestion was found on Alpharetta Hwy approaching the signal at SR 92. In some cases the queue at SR 92 extended back through several upstream signals.

During most observations, westbound congestion was found on SR 92 approaching the series of signals between SR 400 and Alpharetta Hwy; the primary bottlenecks were located at Warsaw Rd, Old Roswell Rd and Alpharetta Hwy. (See photos 528 - 532.JPG)

During most observations, the southbound exit ramp at SR 92 was congested; vehicles were typically queued in the left lane at the signal at the head of the ramp. Intermittently, the exit queue extended back onto the shoulder of SR 400. (See photos 528 - 532)






Before 6:00 p.m., southbound congestion was typically found on Mansell Rd approaching SR 92; single lane queue populations (right lane of two) ranged from approximately 20-30 vehicles. (See photo 527.JPG)

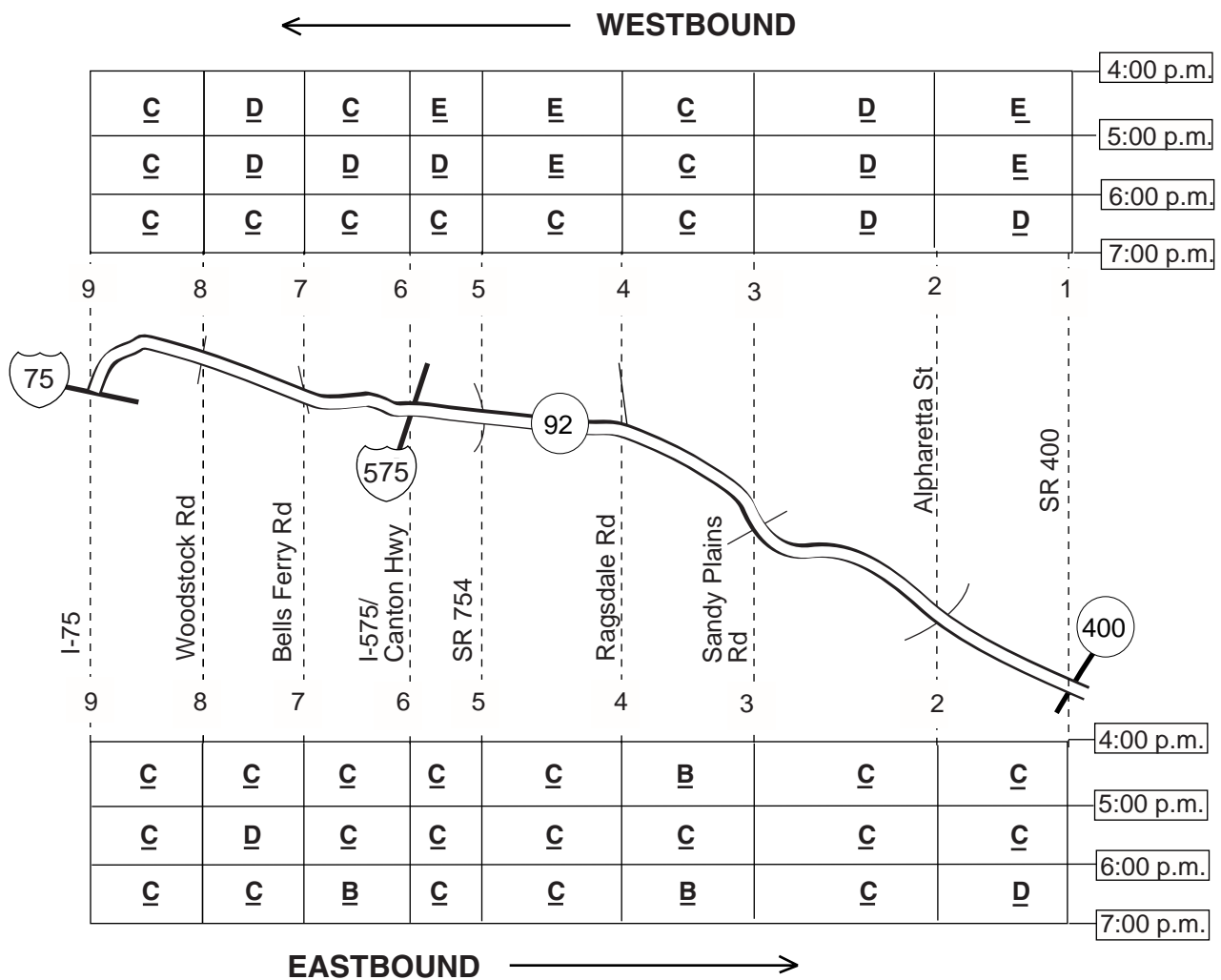
Intermittently, eastbound congestion was found on Alpharetta Hwy approaching the signal at SR 92; when congested, queue populations typically ranged from approximately 20-30 vehicles per lane (two lanes).

Intermittently, the northbound exit ramp to eastbound SR 92 was congested; when congested, approximately 20 vehicles were queued at the head of the ramp. (See photos 528 - 532.JPG)

SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

SR 92 (CROSSVILLE / WOODSTOCK / ALABAMA RD)
(Cherokee / Fulton Co.)
EVENING (FALL 1998)



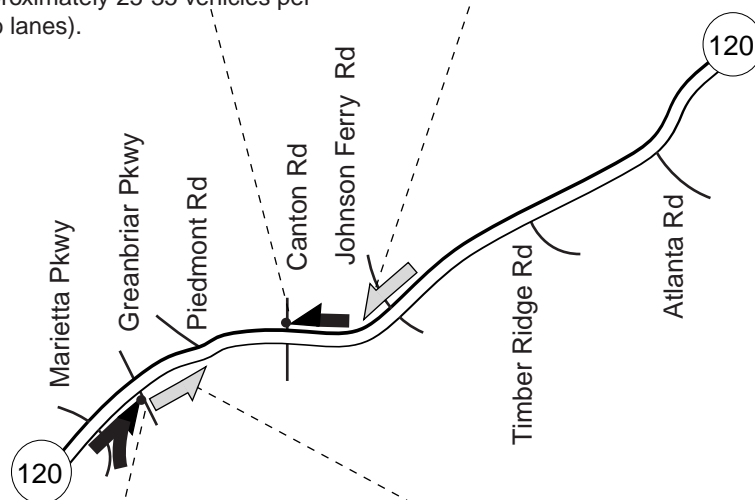
ROSWELL RD (SR 120) (Cobb County)

EVENING (FALL 1998)



During most observations between 5:00 and 6:00 p.m., westbound congestion was found on Roswell Rd approaching the signal at Canton Rd; queue populations typically ranged from approximately 25-35 vehicles per lane (two lanes).




Intermittently, large westbound platoons were found on Roswell Rd approaching Johnson Ferry Rd; traffic typically appeared to clear this signal without experiencing significant delay.



During most observations after 5:00 p.m., eastbound congestion was found on Roswell Rd approaching the signal at Greenbriar Pkwy; the queue intermittently extended back through the pair of signals at the Marietta Pkwy interchange. Vehicles exiting Marietta Pkwy at Roswell Rd typically encountered this queue on the exit ramp.

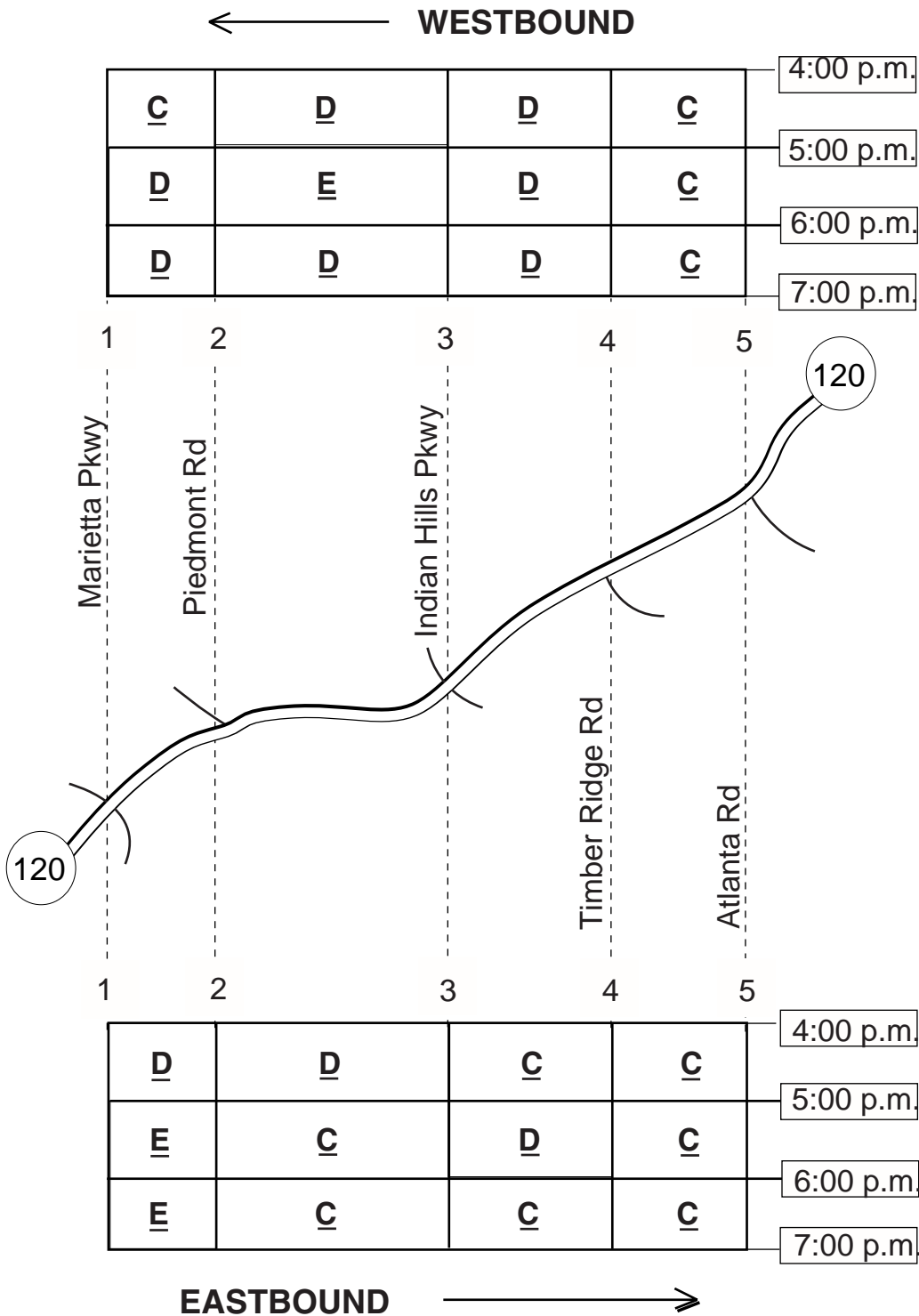
During most observations, heavy eastbound traffic flow was found on Roswell Rd between Greenbriar Pkwy and Piedmont Rd; however, locations consistently generating significant congestion were not found.

SIGNALIZED HIGHWAY TRAFFIC QUALITY

-  Intermittent congestion or slow moving platoons along a highway segment
-  Congested signalized intersection (intermittent)
-  Congested signalized intersection (continuous)

ROSWELL RD (SR 120)
(Cobb County)

EVENING (FALL 1998)



Appendicies

APPENDIX A

METHODOLOGY DESCRIPTION

Procedures for determining freeway level-of-service

PERFORMANCE MEASURE: DENSITY-BASED LEVEL OF SERVICE

According to the *1997 Update to the Highway Capacity Manual* (the HCM), the defining parameter of freeway level-of-service is density, measured in units of passenger-cars per lane per mile (pcplpm). While densities are commonly calculated from speed and volume data, another method is to measure densities directly from aerial photographs. This is the approach used in the Atlanta survey program.

The LOS rating system uses the letters “A” through “F” to describe traffic quality: LOS “A” represents superior traffic quality (very light traffic), while LOS “F” represents poor traffic quality (congested flow involving various degrees of delay). These letters are assigned based on how densely cars are traveling on the road. Research has shown that for all densities below 40 pcplpm, vehicles generally move at or close to normal highway speed; LOS “A” through “E” represent these densities according to the following table (pcplpm):

- LOS “A”:** densities from **zero to 10** (very light traffic);
- LOS “B”:** densities from **11 to 16** (light to moderate traffic);
- LOS “C”:** densities from **17 to 24** (moderate traffic);
- LOS “D”:** densities from **25 to 32** (moderate to heavy traffic);
- LOS “E”:** densities from **33 to 45** (heavy traffic, but still at speeds close to free-flow)

At densities greater than **40**, speeds typically decrease and traveler delays are incurred. Because flow at all densities greater than **45** are regarded as LOS “F”, this report attaches actual densities to all LOS “F” ratings. Accordingly:

LOS “F”:

- Densities from **45 to 60** indicate delay involving minor degrees of slowing; average speeds usually range between 50 and 30 mph;
- Densities from **60 to 80** indicate traffic flow at average speeds usually ranging between 30 and 20 mph; some stopping is possible
- Densities from **80 to 100** indicate congested stop-and-go traffic flow, with some stopping possible; average speeds usually range between 20 and 10 mph;
- Densities above **100** indicate severe congestion, with considerable stop-and-go flow likely. For reference, densities above **110** usually indicate the presence of unusual events (accidents, roadwork, etc.). The practical maximum value for density measurements is **180**; the theoretical maximum value is **264** (at 20 feet per vehicle). Again, daily recurring congestion rarely will measure densities above **100**.

DATA REDUCTION PROCEDURES

From overlapping time-stamped photographs, densities by highway segment were determined by manual counts taken along the entire segment length. Vehicles were classified as cars, trucks, buses, or tractor-trailers when counted; later, passenger-car equivalents (pce's) were derived according to the following table:

<u>Vehicle type:</u>	<u>PCE's:</u>
cars	1
trucks	1.5
tractor-trailers	2.0
buses	1.5

Data that were atypical due to roadwork or to known or suspected incidents were coded for exclusion from the averaging process. All data were then entered into a microcomputer database program, which performed the following tasks: 1) samples were grouped by 15 minute time slice; 2) average densities were calculated; and 3) densities were converted into service levels "A" through "F". The computer then prepared matrices showing each averaged service level rating plotted by time and highway segment. These data matrices were then copied into the traffic quality tables which are provided in this report.

In the tables, all LOS F conditions (congested traffic flow) have been outlined and shaded; this permits quick identification of locations experiencing demand at levels exceeding capacity. Because LOS "F" encompasses a wide range of densities, the actual density values are entered next to the "F"; using the travel characteristics in the density ranges provided above, the nature of the flow in LOS F segments can be determined.

While examining the photography, data technicians also identified side streets and on/off ramps that were congested. Where these problems were recurring, descriptive narratives were prepared. These narratives, together with other observations, are provided on "narrative" maps set opposite each traffic quality table.

APPENDIX B

METHODOLOGY DESCRIPTION

Procedures for determining arterial highway traffic quality

Due to the interrupted nature of traffic flow on signalized highways, density is usually not a preferred performance measure for traffic quality. This is because long segments of roadway often contain few or no vehicles, not for lack of demand, but because vehicles are intermittently held at signalized intersections.

For this and other reasons, the defining parameter for arterial highway level-of-service is travel time over distances of at least one mile in downtown areas and at least two miles in other areas (refer to the *1997 Update of the Highway Capacity Manual* (HCM), page 11-4). This measure cannot be obtained efficiently across a large region by a fast-moving airplane.

On the other hand, various levels of traffic quality can easily be seen from above. Trained aerial observers can clearly and consistently differentiate between highways that are lightly, moderately, and heavily traveled. Furthermore, bottlenecks are easily found from above: the more severe the problem, the better it shows up in aerial photographs.

Thus Skycomp has developed a *qualitative* measure of traffic flow on arterial highways, to be applied through examination of 100% overlapping photographic coverage of each highway segment. This methodology and the accompanying rating scale was developed to satisfy the following objectives:

- the rating scale cover the full range of traffic quality on arterial highways, from empty to densely congested streets, with reasonable gradations in between;
- the methodology be repeatable such that different persons would generally assign the same ratings when viewing the same photographs;
- the ratings are not sensitive to photographs being taken at various points in the signal cycle;
- for ratings that indicate “congestion”, descriptive narratives could be attached which qualify the ratings and which designate supporting photography;
- the methodology be reasonably consistent with the descriptions of the six service levels in the HCM (but without regard to the travel-time criteria, which are the defining parameter).

Because of the last objective, a six-point scale was chosen, also using the letters “A” through “F”. Skycomp’s arterial performance ratings have been underlined in order to designate them as service level surrogates, rather than service level measurements).

Thus the performance rating scale used in this report is defined as follows:

Performance Rating A:

— very few cars using the roadway; or deserted roadway. *[HCM description for LOS A: Vehicles are seldom impeded in their ability to maneuver within the traffic stream; free-flow operations.]*

Performance Rating B:

— light traffic flow; little or no platooning. *[HCM description for LOS B: reasonably unimpeded operations; ability to maneuver only slightly restricted.]*

Performance Rating C:

— moderate traffic flow; not heavy, not light. Platoon populations not greater than 15 vehicles per lane. *[HCM description for LOS C: stable operations; some restrictions to ability to maneuver.]*

Performance Rating D:

— heavy traffic; many cars on the road. Significant queuing at signals, but all should clear on green (less than 20 vehicles per lane queued at all signals). Platoon populations typically between 15 and 25 vehicles per lane. *[HCM description for LOS D: borders on unstable flow where small increases in flow may cause substantial decreases in arterial speed.]*

Performance Rating E:

— congested traffic. Segment may contain one or two intersections with queues of more than 20 vehicles per lane (all may not clear on green). Platoon populations greater than 25 vehicles per lane. On long one-lane segments, the movement of vehicles may resemble a funeral procession, with little opportunity for side-traffic to enter the roadway. *[HCM description for LOS E: significant delays and low average travel speeds; typical causes include adverse progression, high signal density, high volumes, extensive delays at critical intersections, and inappropriate signal timing.]*

Performance Rating F:

— severely congested traffic; includes: vehicles backing through an upstream signal, or for the length of the segment; a series of intersections with more than 20 vehicles per lane queued at each; segment containing one severely congested intersection, with more than 40 vehicles per lane queued approaching the signal (may take two or more signal cycles to clear the intersection). *[HCM description for LOS F: flow at extremely low speeds; high delays and extensive queuing likely at critical intersections.]*

The primary evaluator was trained to view each segment in its entirety (lay out photos side-by-side), and start by testing whether a rating of “C” was appropriate for the segment. Working from this “C” rating, the evaluator could then adjust the rating upward or downward as warranted by the conditions.

In the event that an incident or temporary roadwork significantly affected the rating, the evaluator attached a code which would exclude the affected data from averaging with the results of other days.

After a quality-control review by the project manager, all ratings were digitized and entered into a computer database program for evaluation and averaging. Ratings were printed by time slice and by day, so that unusual ratings could be identified. If there were odd results (for example, “B”

ratings on three days and an “F” rating on one day), the photography was checked for possible error or incident. If the data were clearly atypical but a cause could not be identified, a code “u” (“unknown”) was attached to the data (like the incident and roadwork codes, this would also exclude the data from averaging).

Data were then output once again as averages, and entered into the traffic quality tables shown in the main body of the report. It should be remembered that these ratings are averages, and thus a location with intermittently severe congestion may get the same rating as locations with steady less-severe congestion. For this reason, descriptive notes have been provided on the opposing pages which qualify all “congested” ratings.

APPENDIX C

FLIGHT DIRECTORY

FLIGHT		DAY OF			FLIGHT		DAY OF		
NUMBER	DATE	WEEK		AM / PM	NUMBER	DATE	WEEK		AM / PM
1	October	5th	Monday	Evening	34	October	16th	Friday	Morning
2	October	5th	Monday	Evening	35	October	27th	Tuesday	Morning
3	October	5th	Monday	Evening	36	October	27th	Tuesday	Morning
4	October	5th	Monday	Evening	37	October	27th	Tuesday	Morning
5	October	5th	Monday	Evening	38	October	27th	Tuesday	Morning
6	October	5th	Monday	Evening	39	October	27th	Tuesday	Morning
7	October	7th	Wednesday	Evening	40	October	27th	Tuesday	Morning
8	October	7th	Wednesday	Evening	41	October	27th	Tuesday	Morning
9	October	7th	Wednesday	Evening	42	October	28th	Wednesday	Morning
10	October	7th	Wednesday	Evening	43	October	28th	Wednesday	Morning
11	October	7th	Wednesday	Evening	44	October	28th	Wednesday	Morning
12	October	8th	Thursday	Evening	45	October	28th	Wednesday	Morning
13	October	8th	Thursday	Evening	46	October	28th	Wednesday	Morning
14	October	8th	Thursday	Evening	47	October	28th	Wednesday	Morning
15	October	8th	Thursday	Evening	48	October	28th	Wednesday	Morning
16	October	8th	Thursday	Evening	49A	October	29th	Thursday	Morning
17	October	13th	Tuesday	Evening	49B	October	28th	Wednesdat	Evening
18	October	13th	Tuesday	Evening	50	October	29th	Thursday	Morning
19	October	13th	Tuesday	Evening	51	October	29th	Thursday	Morning
20	October	13th	Tuesday	Evening	52	October	29th	Thursday	Morning
21	October	13th	Tuesday	Evening	53	October	29th	Thursday	Morning
22	October	13th	Tuesday	Evening	54	October	29th	Thursday	Morning
23	October	14th	Wednesday	Evening	55	October	29th	Thursday	Morning
24	October	14th	Wednesday	Evening	56	October	30th	Friday	Morning
25	October	14th	Wednesday	Evening	57	October	30th	Friday	Morning
26	October	14th	Wednesday	Evening	58	October	30th	Friday	Morning
27	October	14th	Wednesday	Evening	59	October	30th	Friday	Morning
28	October	14th	Wednesday	Evening	60	October	30th	Friday	Morning
29	October	15th	Thursday	Morning	61	October	30th	Friday	Morning
30	October	15th	Thursday	Evening	62	October	30th	Friday	Morning
31	October	15th	Thursday	Evening	63	November	3rd	Tuesday	Morning
32	October	15th	Thursday	Evening	64	November	4th	Wednesday	Morning
33	October	15th	Thursday	Evening	65	November	4th	Wednesday	Morning
					66	November	5th	Thursday	Morning

HOW TO READ DENSITY TABLES

Densities

In units of 10:

">" indicates densities >120

"+" indicates densities 99 to 120

"9" indicates densities 90 to 99

"8" indicates densities 80 to 89

etc...

APPENDIX F

METHODOLOGY DESCRIPTION

Procedures for obtaining speed/density samples for calibration of the Van Aerde Speed / Density Model

BACKGROUND

In the spring of 1995, Skycomp collected data to compare the speed of vehicles through congested freeway zones with corresponding densities obtained from aerial photographs. The purpose was to explore the relationship between the two, and, given a reasonable correlation, to prepare a model by which vehicle speeds could be estimated from aerial density photographs.

The program was conceived and executed by the Metropolitan Washington (D.C.) Council of Governments (MWCOC). Aerial data were collected by Skycomp; analysis of the data and calibration of the Van Aerde speed/density model were conducted by MWCOC (draft paper included in this appendix).

A secondary objective was to evaluate the accuracy of aerial speed and density measurements by comparing them to data collected by traditional methods (floating cars and loop detectors embedded in the pavement).

Accordingly, segments of freeway were chosen to be surveyed that: 1) were expected to generate congested traffic flow; and 2) either contained a loop detector station or would accommodate quick turnarounds for multiple floating car runs. Thus, while data were being collected in the air (290 speed samples were obtained from the air, along with corresponding densities), loop detector or floating car data were collected concurrently on the ground.

The outcome of this study was a finding that travel speeds across congested freeway segments could be determined with reasonable accuracy using only aerial density photographs. It was also found that speeds and densities obtained through aerial techniques closely matched data obtained using the traditional ground methods.

PROCEDURES TO OBTAIN SPEED / DENSITY SAMPLES:

The observer/photographer followed the following procedure to obtain all speed/density samples: he first flew along the selected survey segment while taking time-stamped overlapping density photographs of the entire segment; next, at the upstream end, he selected a target "floating" car for tracking; he photographed the target as it entered and departed the segment, while simultaneously timing its run to the nearest second. He then took an "after" density photo set; and then recorded the following information on a clipboard: the time of the sample, the target vehicle description, lane(s) traveled, elapsed time, and any special notes. This procedure was repeated for each speed/density data point.

In the actual course of sampling, this procedure was modified in several ways. First, where cars were moving at high (free-flow) speeds, the density did not change significantly between samples; thus sometimes three or more floating cars were timed between density runs.

Another modification done in-flight is as follows: the observer noted in several cases that the density set taken before the target vehicle went through better reflected the conditions the car encountered than the density set taken after the vehicle went through (or vice versa). This was usually due to a delay in changing film, extra maneuvering the airplane, or any other event which delayed the “after” density sample for several minutes after the completion of the run. While normally the density associated with each speed sample was an average of the “before” and “after” density sets, in these cases only the “before” or “after” density set would be used (as directed by the observer).

With regard to selection of target vehicles, the plan was to select cars that reflected the average speed of traffic, just as floating car drivers are instructed to approximate the speed of traffic flow. Fortunately, vehicles have little freedom to choose their speeds in the congested density ranges (above 40 pcplpm). So, for example, almost any vehicle in a congested traffic stream in the middle lane of three will give a suitable floating car measurement. Even tractor-trailers (unless heavily loaded and traveling uphill) moved at the same speed as passenger cars. Thus the criteria the observer used in selecting each target vehicle was 1) is it in the correct lane; and 2) does the vehicle stand out so that it is easy to keep track of?

Also, in the event that the highway had four travel lanes in one direction, alternating samples were taken from both middle lanes.

In the event that a driver switched lanes while being tracked, the observer noted the lane change and also noted which lane the car spent the majority of time in (this is the lane for which a density count would be made later). In several cases (infrequently), the observer abandoned tracking certain vehicles when: 1) the driver made multiple lane changes, trying to beat the average speed of traffic; 2) the driver switched lanes and changed speeds obviously and significantly; 3) the vehicle turned out to be a heavily loaded truck which delayed the traffic stream; or 4) the observer “lost” the vehicle being tracked. Also, for the samples made with traffic traveling at free-flow speeds, vehicles were abandoned which proved to be traveling significantly faster or slower than the average speed of traffic.

In the event that the target vehicle moved to the right lane in apparent preparation to exit, the observer often was able to switch tracking to another vehicle that had been just behind or ahead of the original vehicle in the same lane (and used the newly adopted vehicle to complete the sample). This was necessary because in some cases six or seven minutes had been invested in the tracking of a specific vehicle, and it was important to avoid wasting that time where possible.

It should also be pointed out that speeds were not tracked for very slow moving queues (densities over 120 / MWCOG samples only). Instead, density runs were made at 5 or 10 minute intervals, such that later on the ground the same vehicles could be found in succeeding sets of density photos; this allowed computation of speeds and associated densities.

DATA PROCESSING

After each flight, a topographic map was prepared for each zone which showed the starting and stopping points for each tracked car. Measurements were then made of the segment length (distance traveled). Then each tracked vehicle was entered into the computer database, including:

1. vehicle description
2. time-of-day
3. initial lane and subsequent lane changes
4. precise travel time (from stopwatch or time-lapse photographs)
5. density-photo preference, if any (default was to average the before- and after- density samples)
6. any special notes pertaining to that vehicle.

After the photos had been processed, each set of overlapping “density” photographs was taped together into a “mosaic” that showed each entire segment. Then vehicles in the required lane(s) were counted, listed by “car”, “truck”, “tractor-trailer” and “bus”. These totals were translated into passenger-car equivalents (PCE’s) using the following values:

<u>Vehicle type:</u>	<u>PCE’s:</u>
cars	1
trucks	1.5
tractor-trailers	2.0
buses	1.5

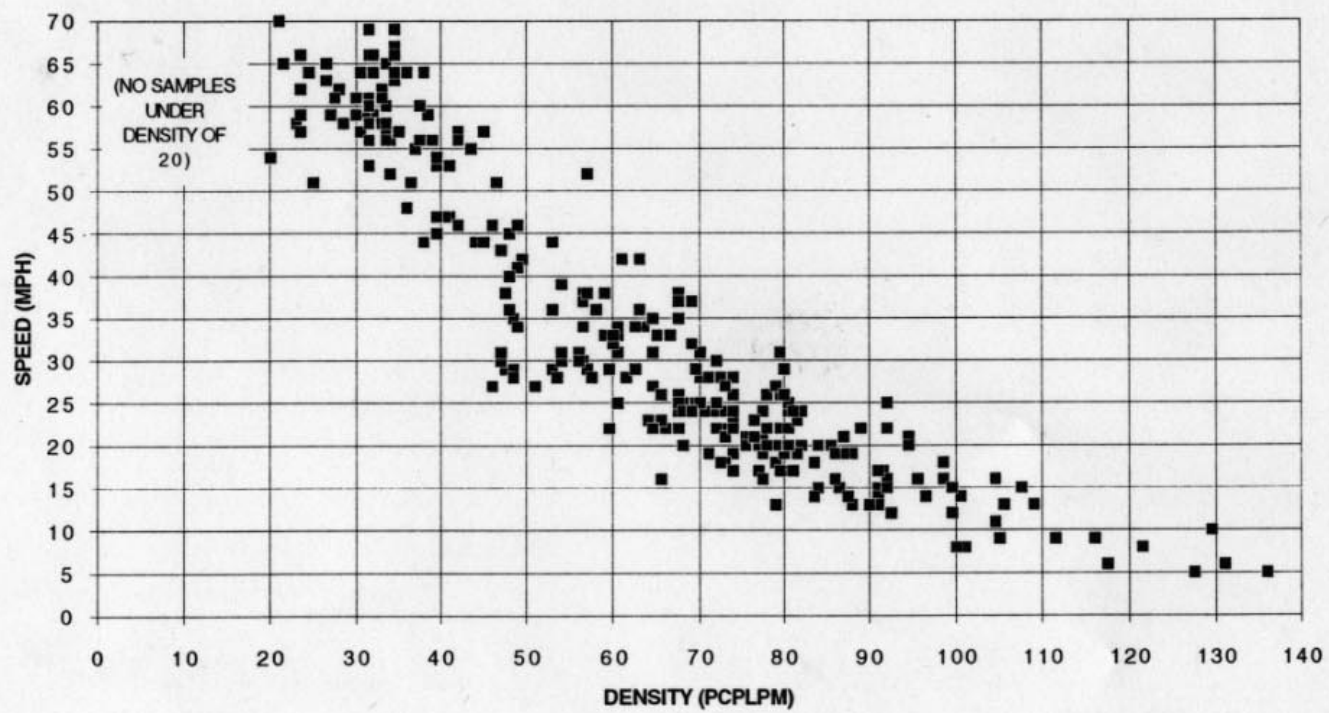
(It should be noted that the distinction between “cars” and “trucks” could not be cleanly made, since there are many varieties of light and heavy pick-ups (both covered and uncovered). In general, a pick-up or van had to be at least twice the size of an average-sized car to be considered a “truck”).

PCE’s were then divided by segment length to calculate densities. These density samples were then matched to corresponding speed samples; each speed/density data pair was then plotted on the chart.

CALIBRATION OF THE VAN AERDE MODEL

The latest draft of the MWCOG paper describing the calibration of the Van Aerde Speed / Density Model for the Washington D.C. metropolitan area is provided next. This paper was authored by Paul DeVivo, the member of MWCOG staff who performed the analysis.

ALL SKYCOMP DATA SAMPLES



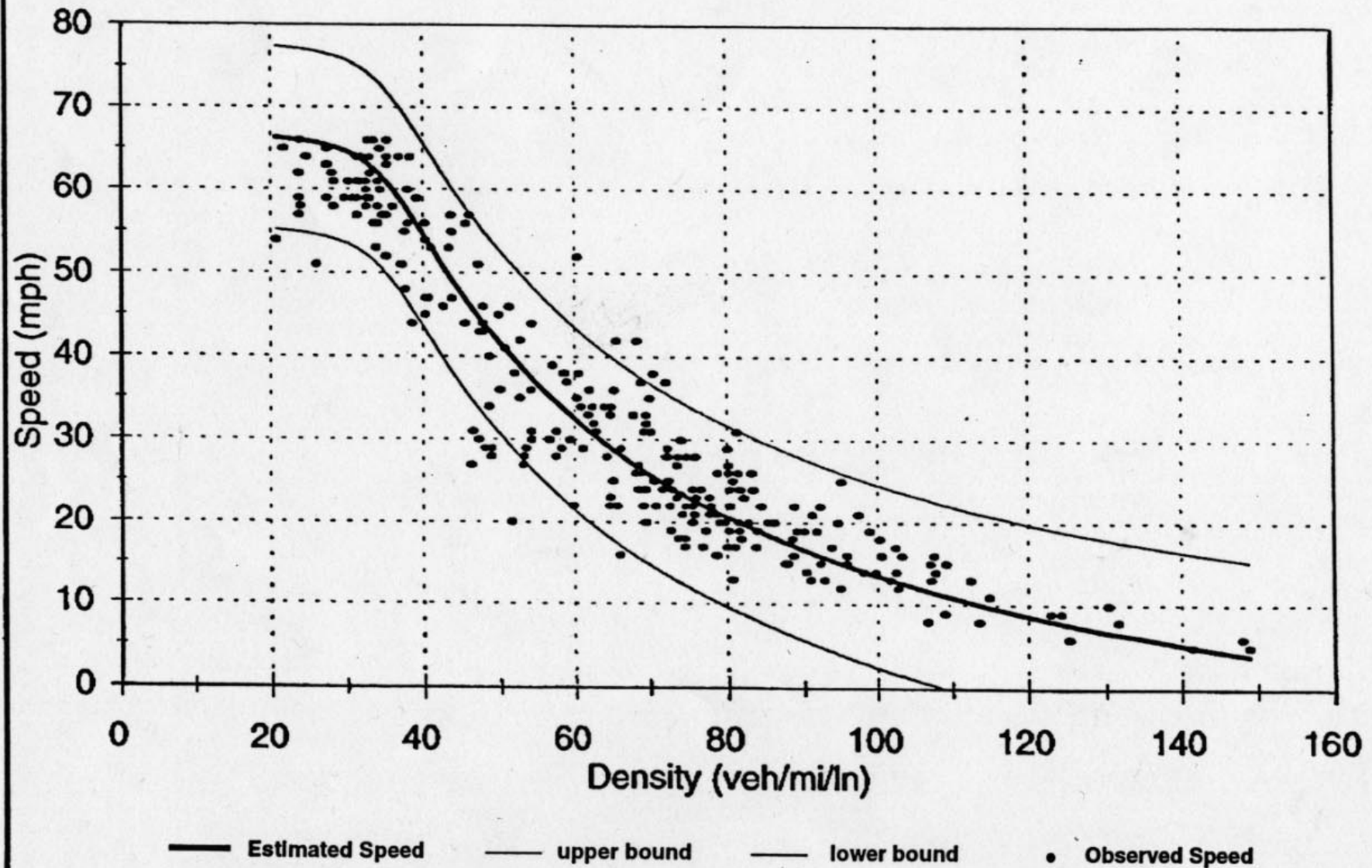
Speed - Density Calibration
Van Aerde Single Regime

free-flow spd = 67 mph / c1 = 0.00512 / c2 = 0.0114 / c3 =

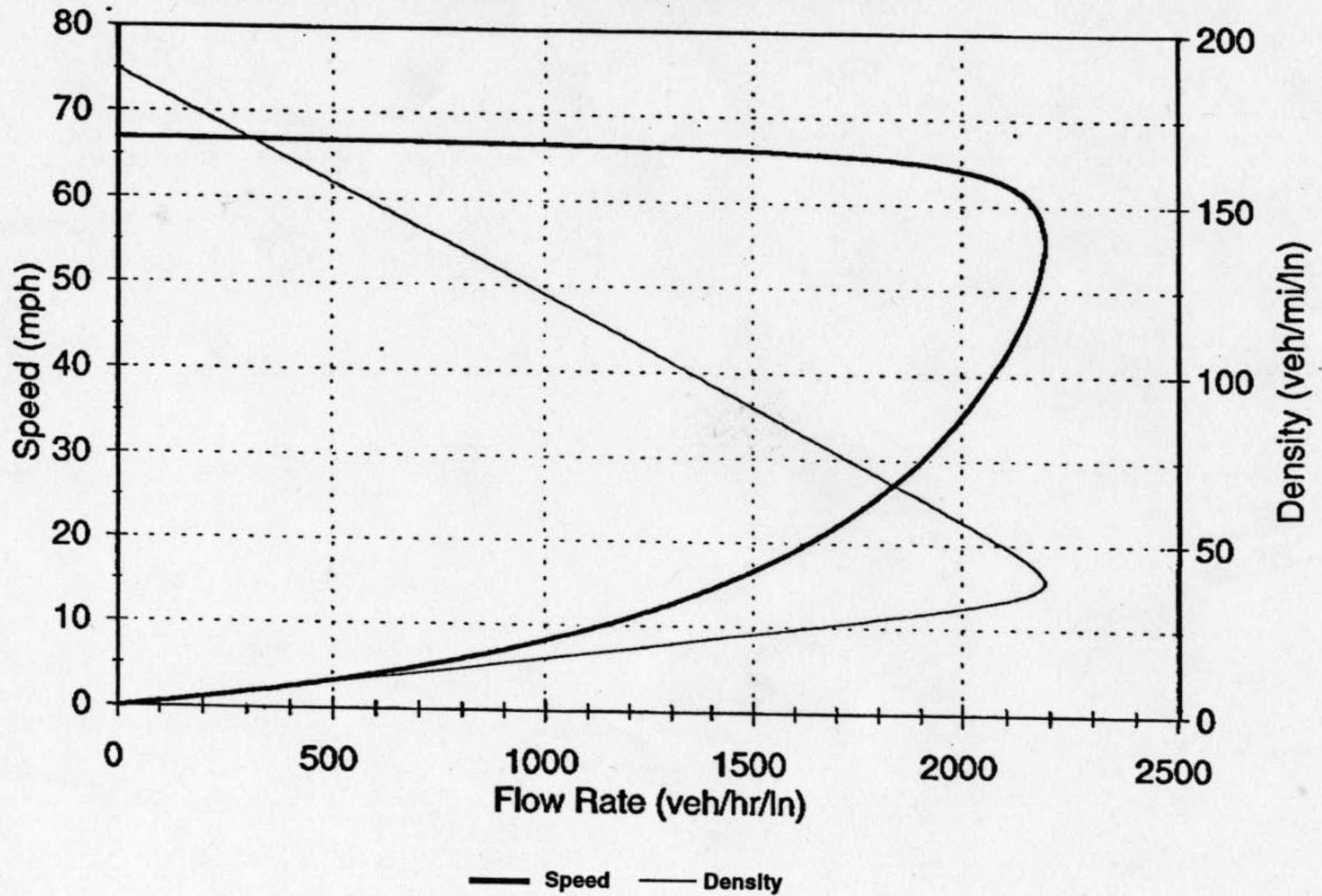
	DENSITY (veh/ln/mi)	SPEED (mph)	VOLUME (veh/ln/hr)	
free-flow	0	67.0	0	
	20	66.4	1,328	
	25	65.8	1,661	
	30	64.6	1,946	
	35	61.3	2,144	
capacity	<u>39</u>	<u>55.8</u>	<u>2,190</u>	
	40	54.7	2,189	
	45	47.8	2,153	
	50	41.9	2,094	
	55	36.8	2,025	
	60	32.6	1,954	
	65	28.9	1,880	
	70	25.8	1,806	
	75	23.1	1,731	
	187	0	0	jam

DRAFT 15 February 1996

Speed-Density Calibration Van Aerde Single Regime Model



Speed-Density Calibration Van Aerde Single Regime Model



APPENDIX G

SPEED / DENSITY SAMPLES IN ATLANTA

BACKGROUND

Speed/density samples were obtained on the freeways in Atlanta to confirm that the speed/density table generated in Washington D.C. (see Appendix F) can be applied to travel in the Atlanta metropolitan area. Four dedicated data-collection flights were conducted for this task, each approximately two-hours duration. The data-collection sites are depicted on page G-2.

PROCEDURES TO OBTAIN SPEED / DENSITY SAMPLES

The observer followed the same procedure as outlined in Appendix F except that densities for each sample were calculated across all lanes (vs. density by lane).

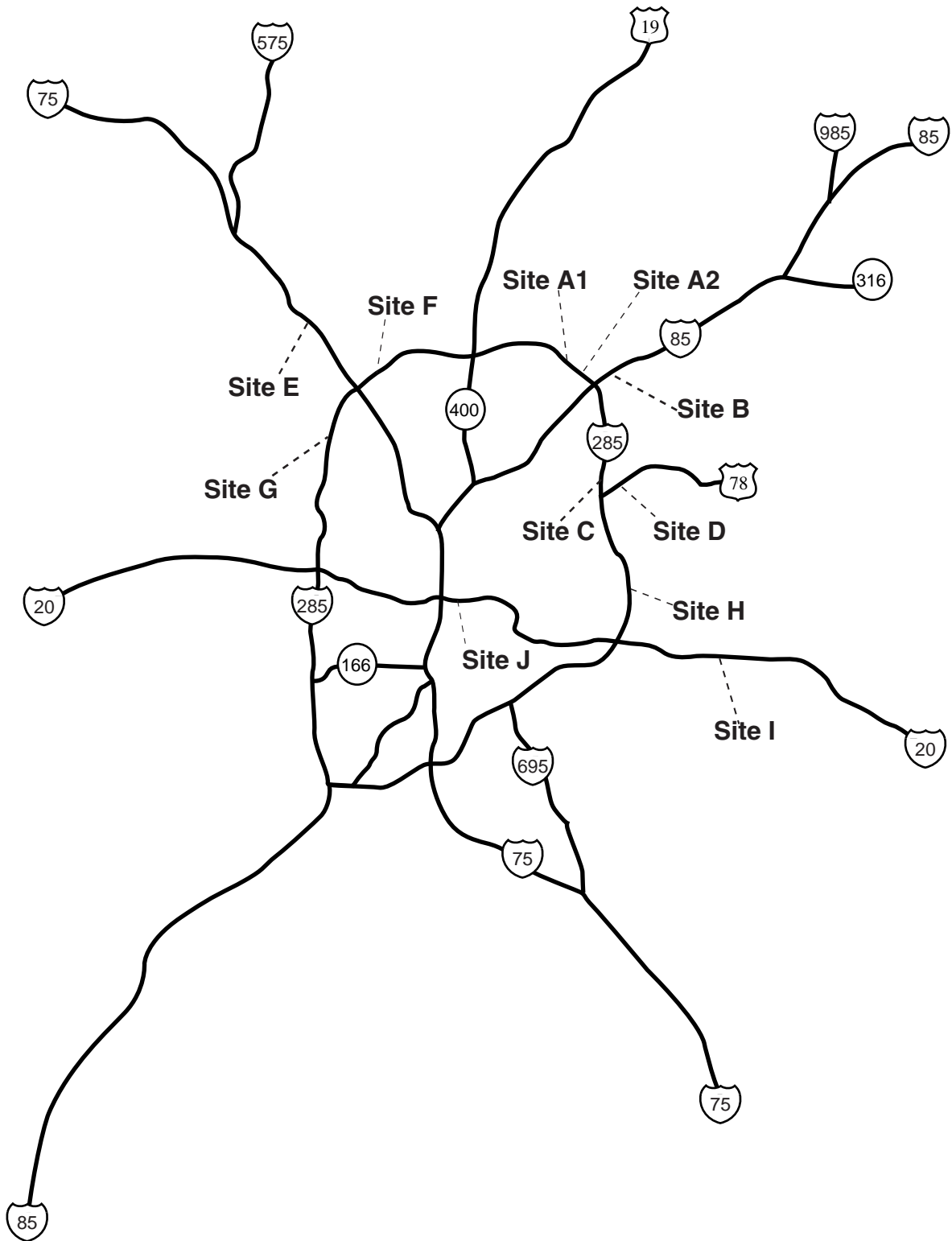
DATA PROCESSING

Data processing was conducted as outlined in Appendix F; altogether, 139 data samples were obtained in Atlanta. These data samples are presented by site location in this Appendix.

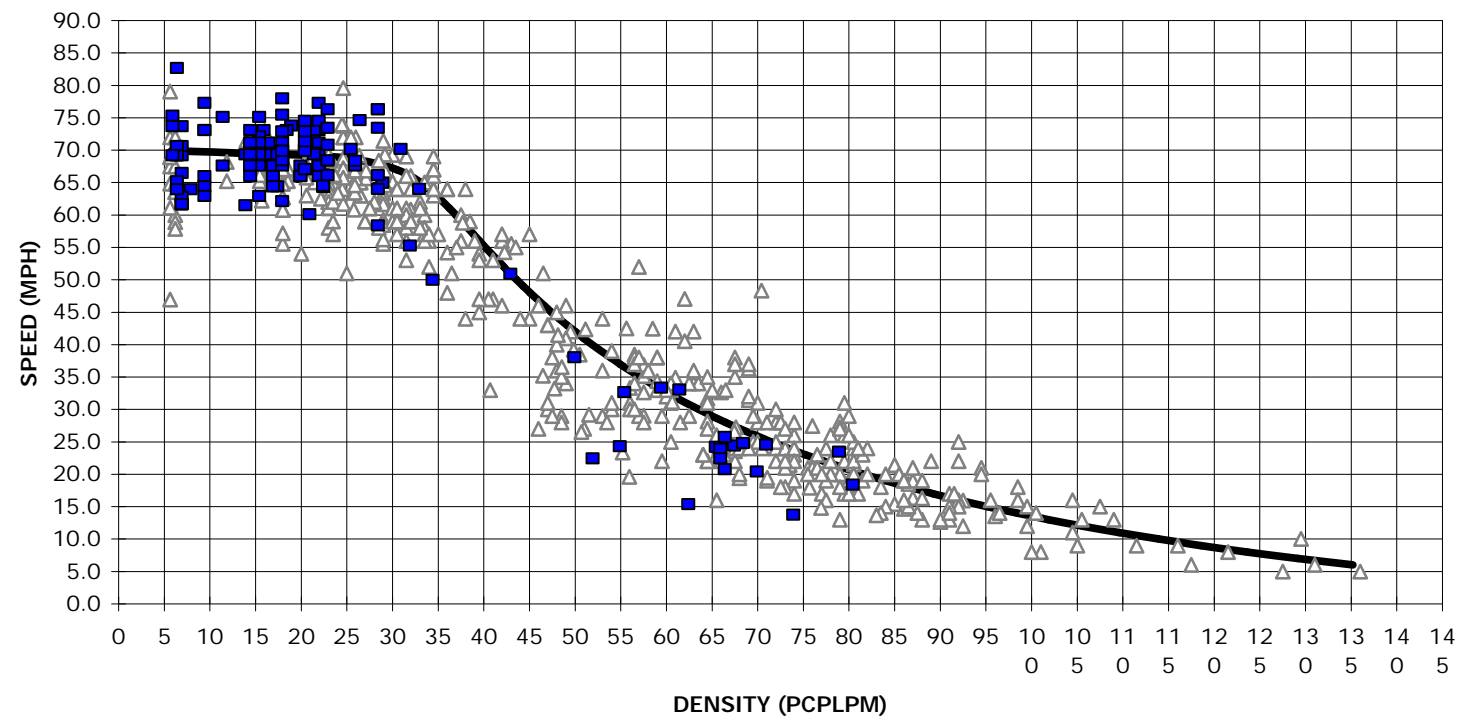
CONCLUSION

Based on the data provided in this Appendix, Skycomp has determined that the Washington D.C. calibration of the Van Aerde model will apply to congested conditions in the Atlanta area. However, free flow speeds are higher than other tested cities. Therefore, free flow speeds have been increased to 70 mph for the purposes of this study.

SPEED / DENSITY SITES IN ATLANTA

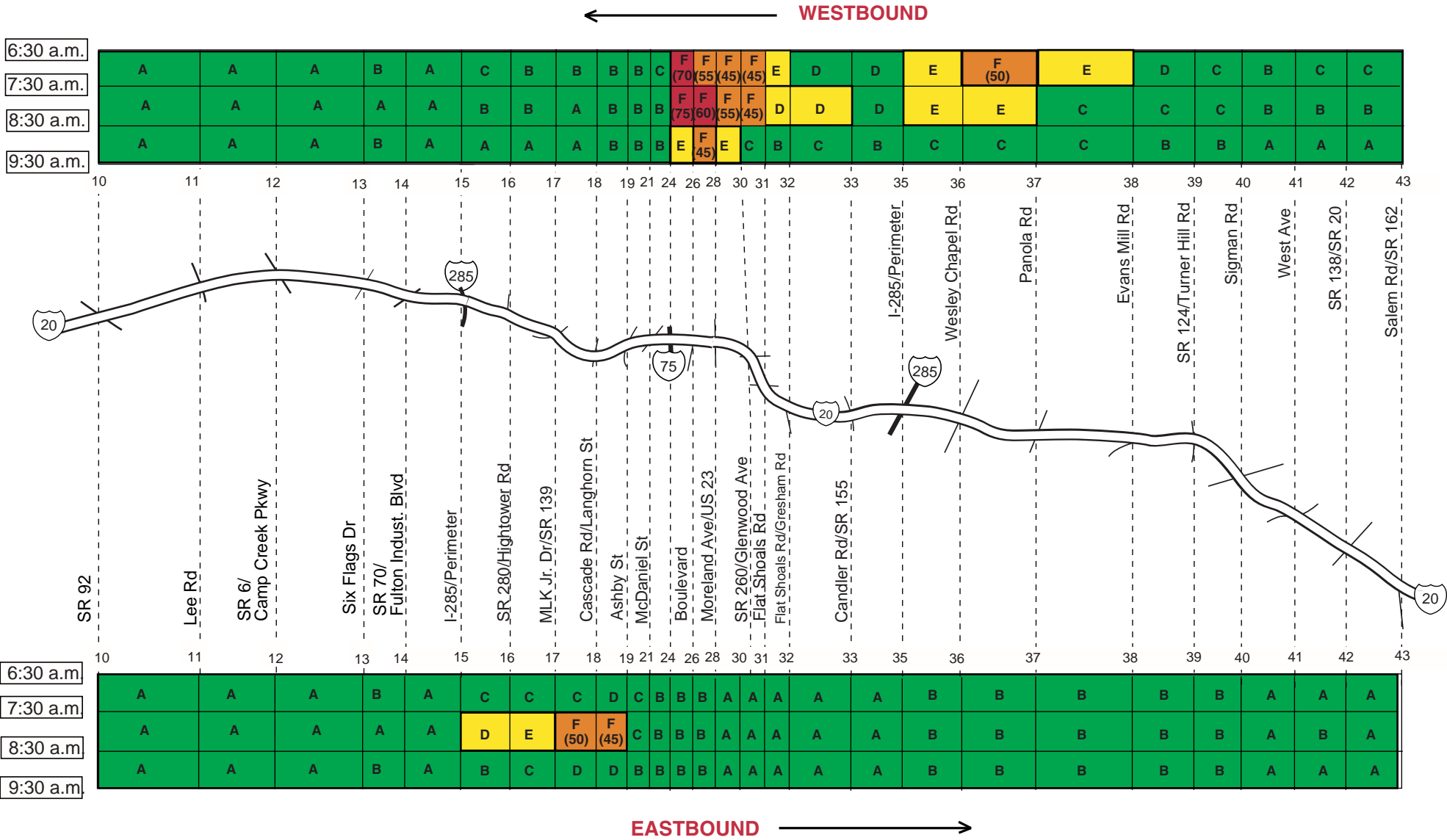


ATLANTA SAMPLES (BLACK SQUARES) vs Other Major Cities



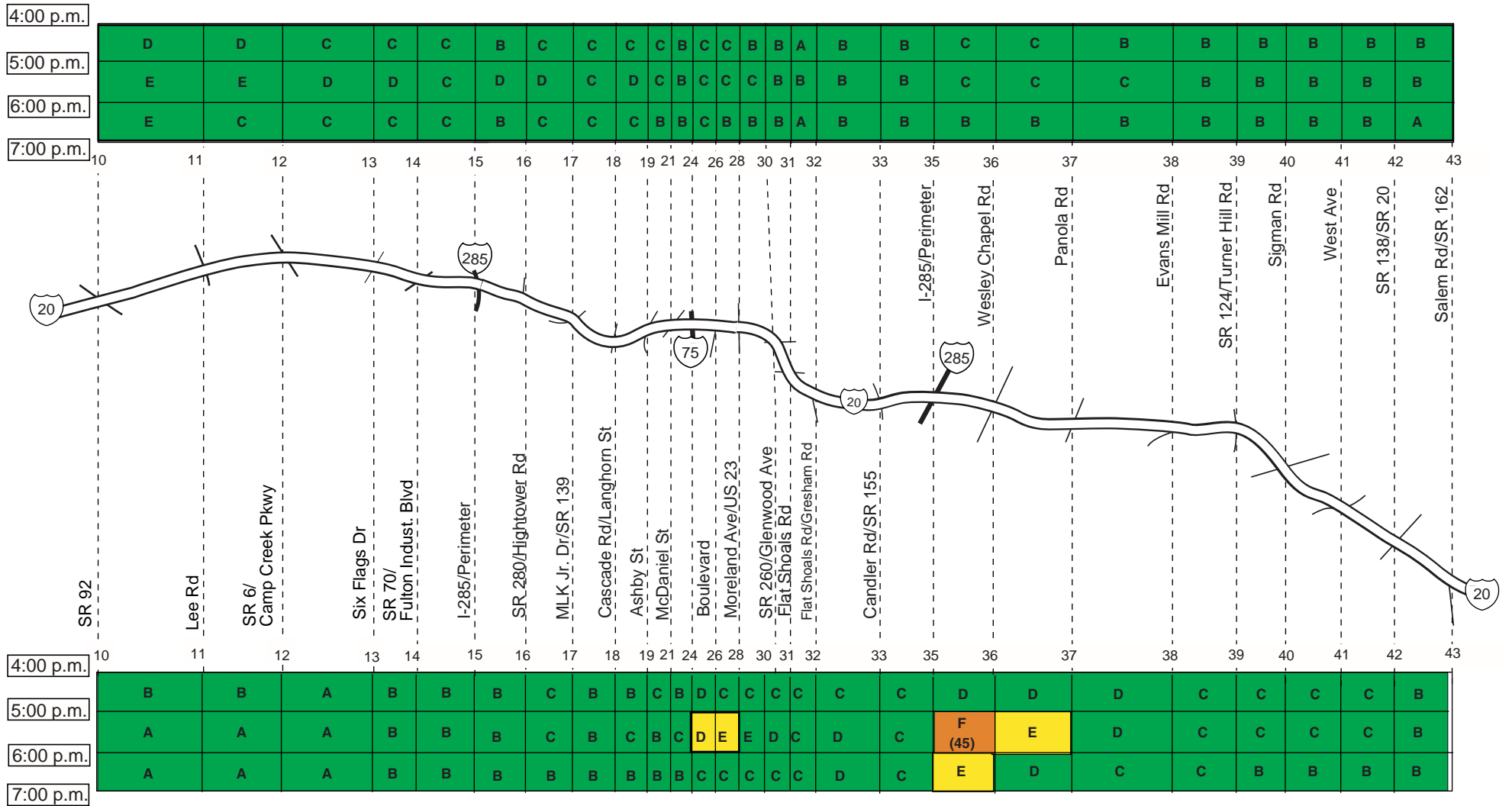
Slideshow Graphics - (use "Page Down" key for PM graphics)

I-20
MORNING (FALL 1998)

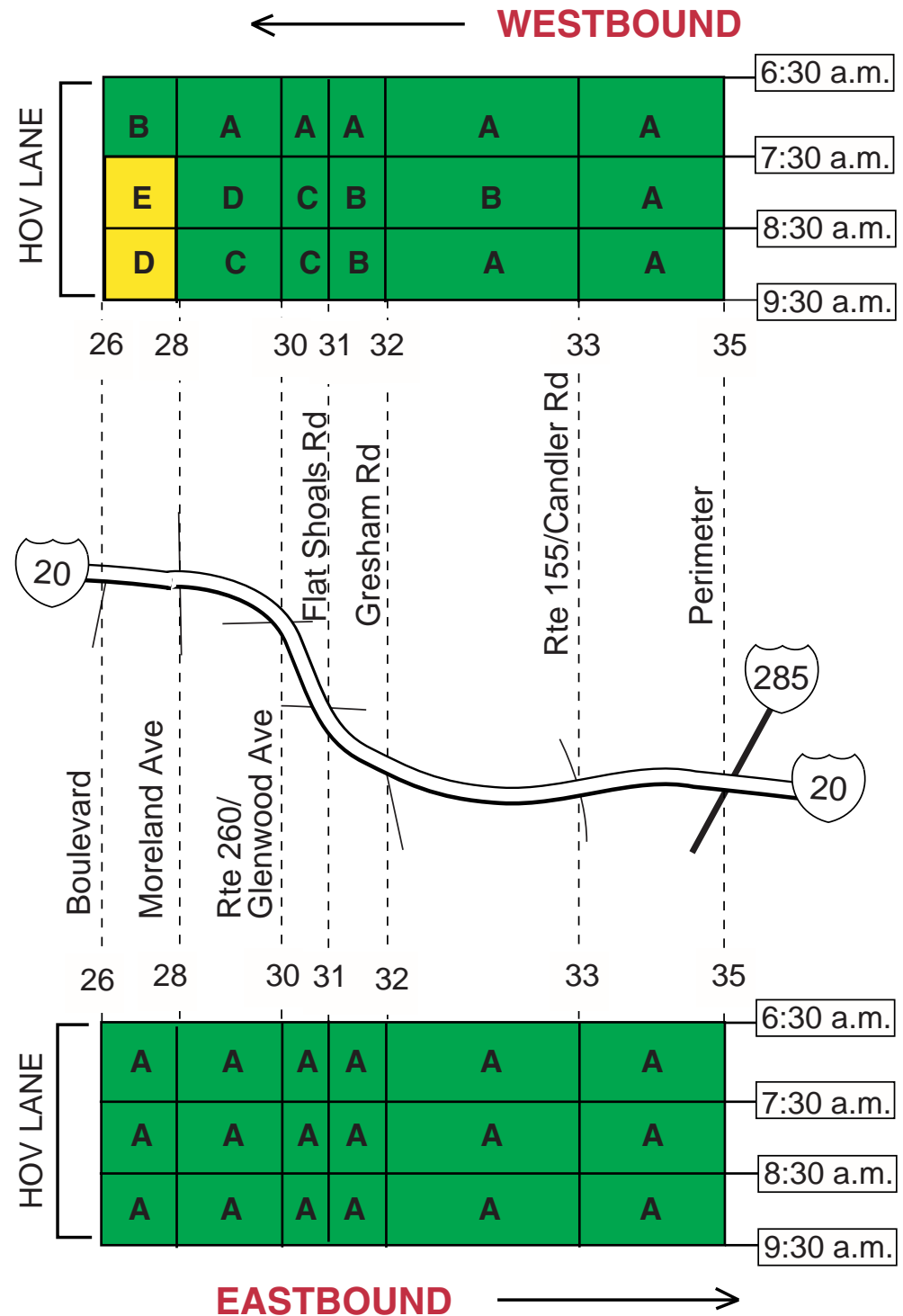


I-20
EVENING (FALL 1998)

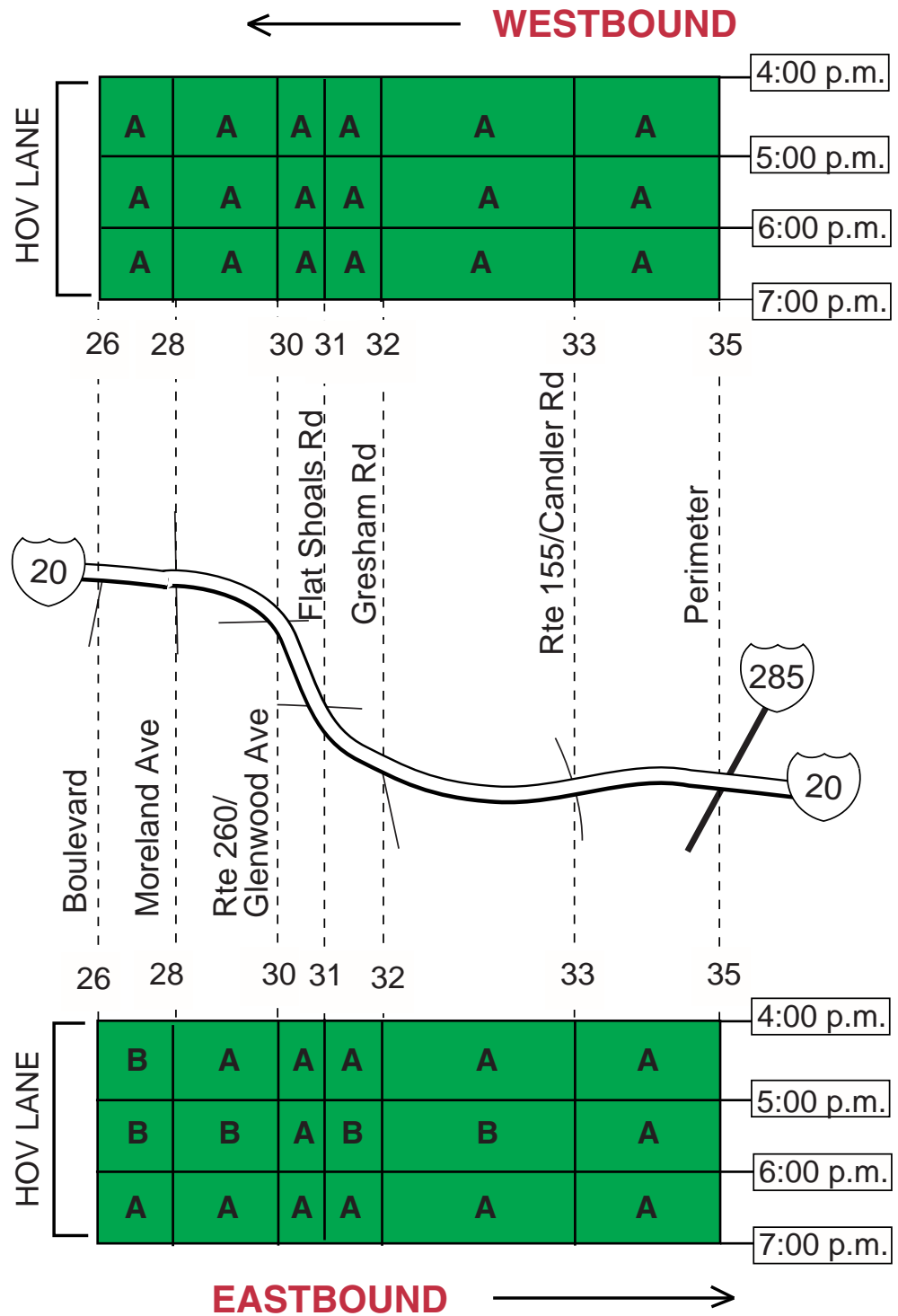
← WESTBOUND



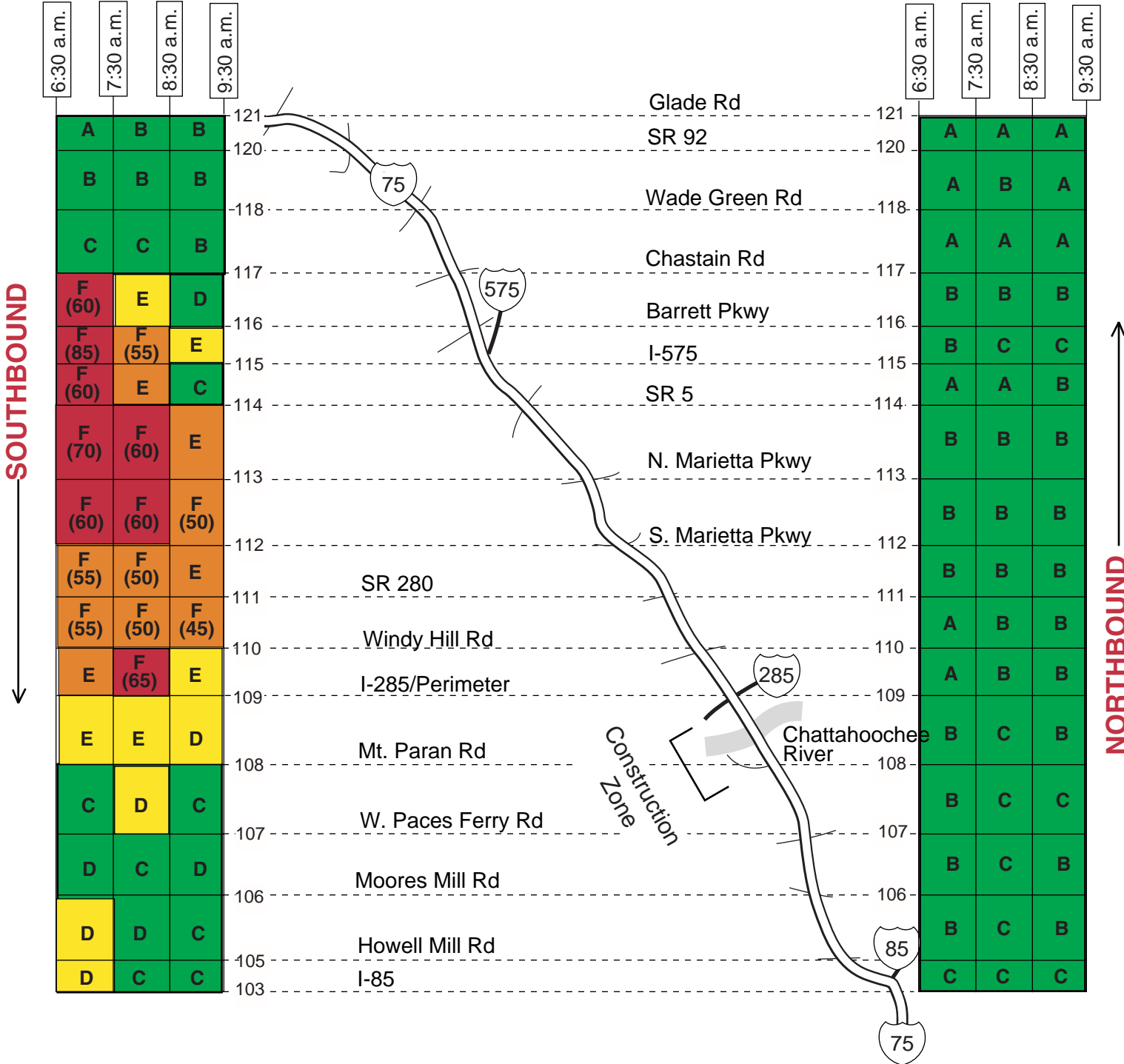
I-20 (HOV) MORNING (FALL 1998)



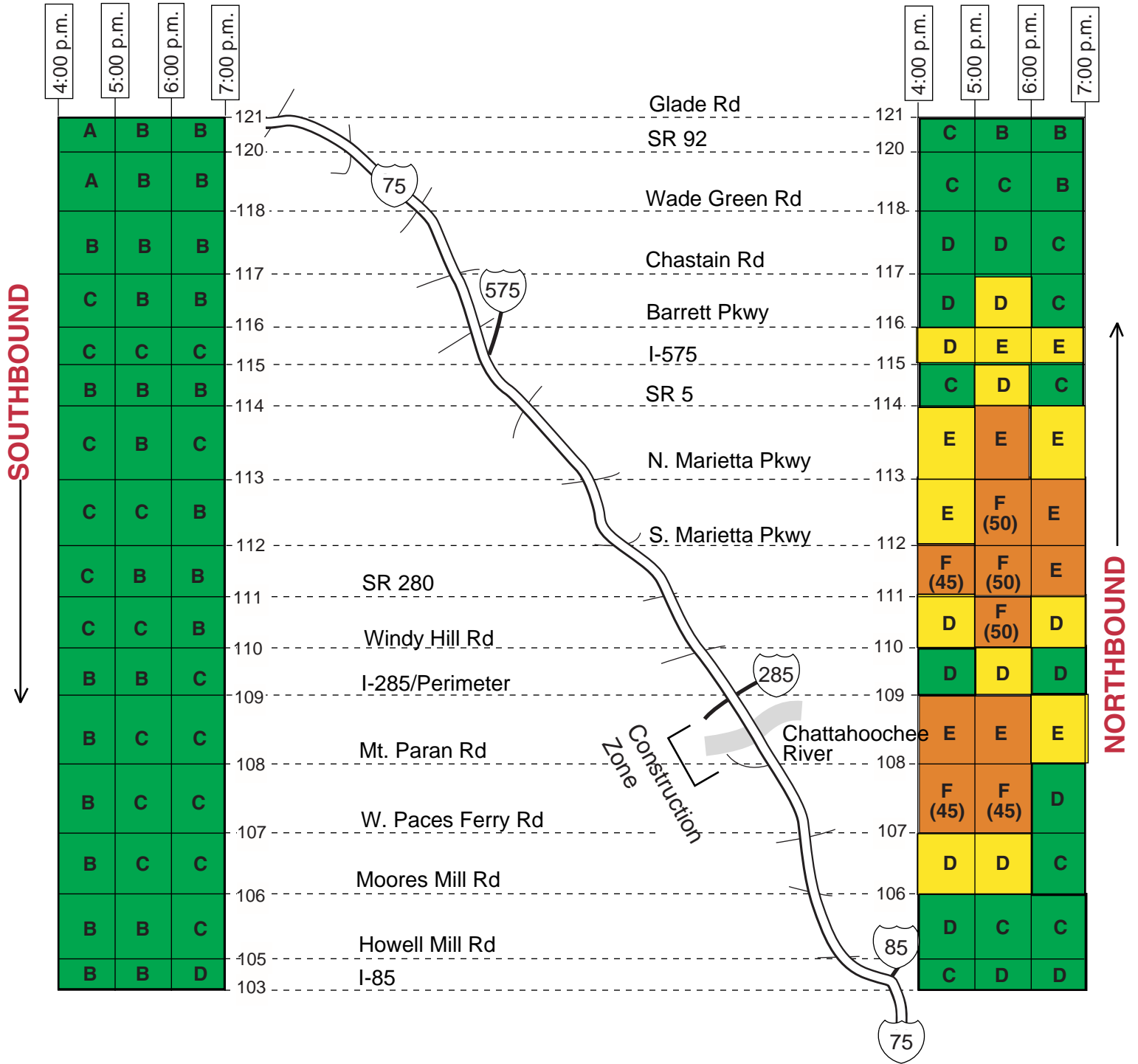
I-20 (HOV) EVENING (FALL 1998)



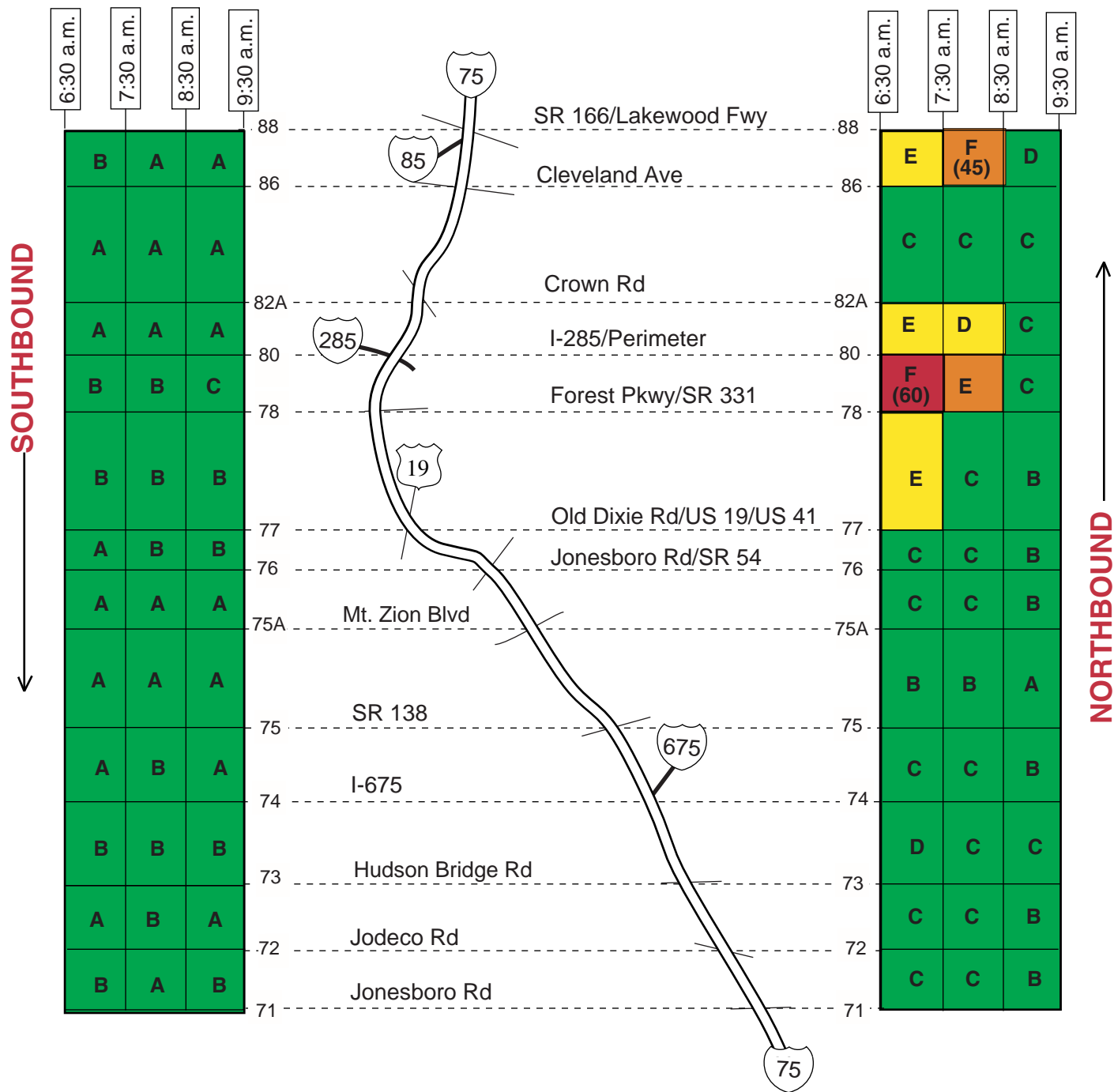
I-75 (NORTH) MORNING (FALL 1998)



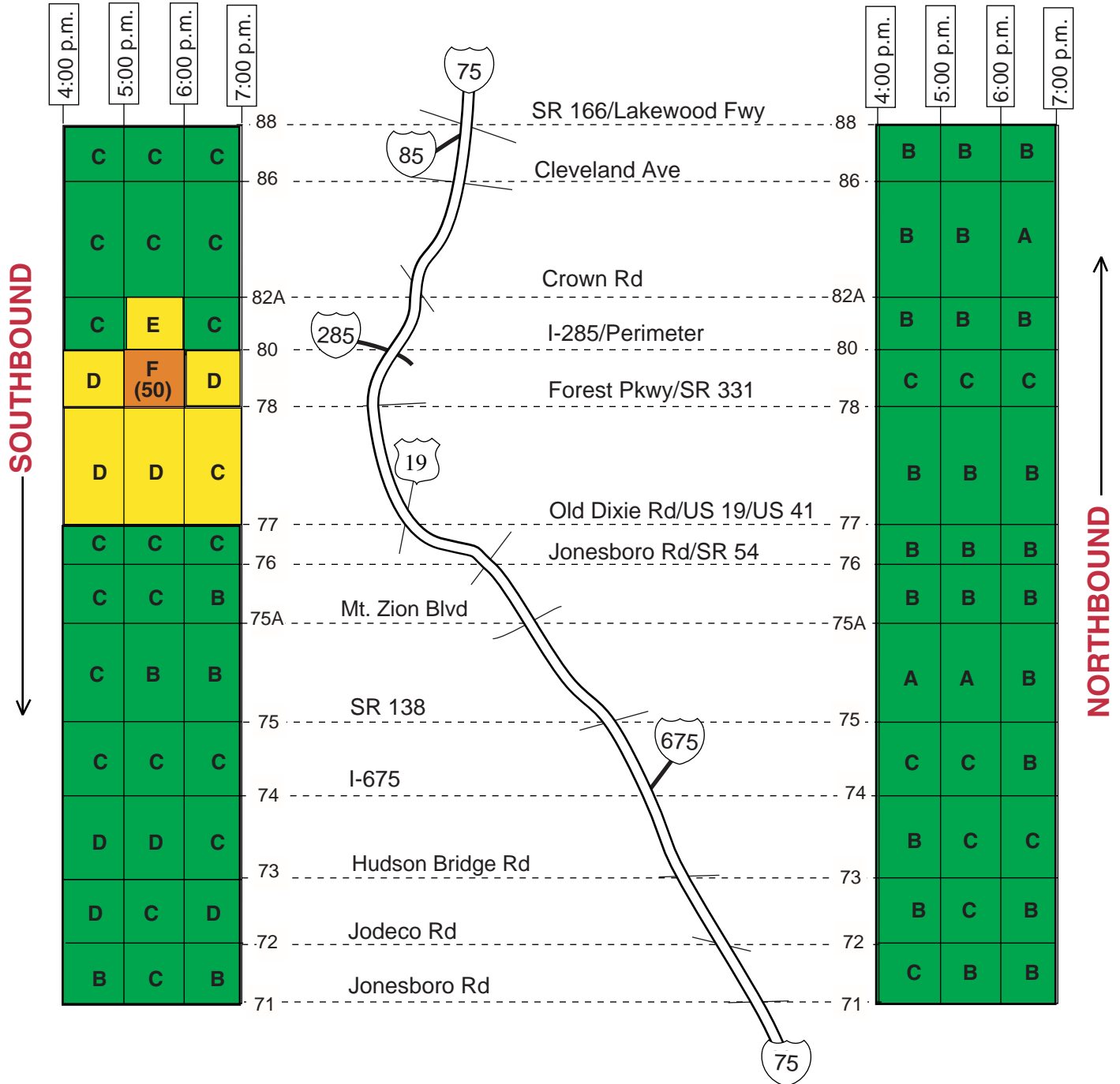
I-75 (NORTH) EVENING (FALL 1998)



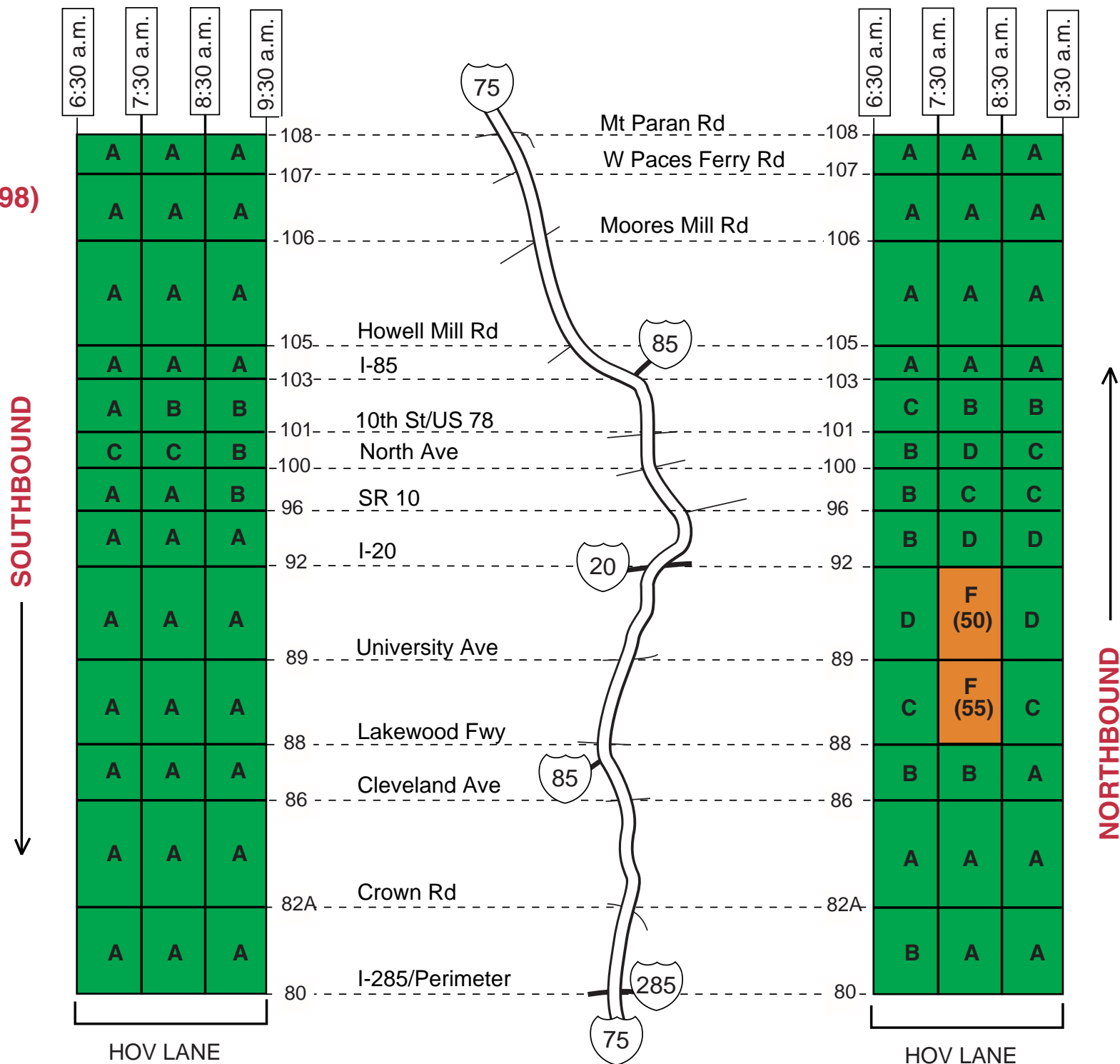
I-75 (SOUTH)
MORNING (FALL 1998)



I-75 (SOUTH) EVENING (FALL 1998)



I-75 (HOV)
MORNING (FALL 1998)

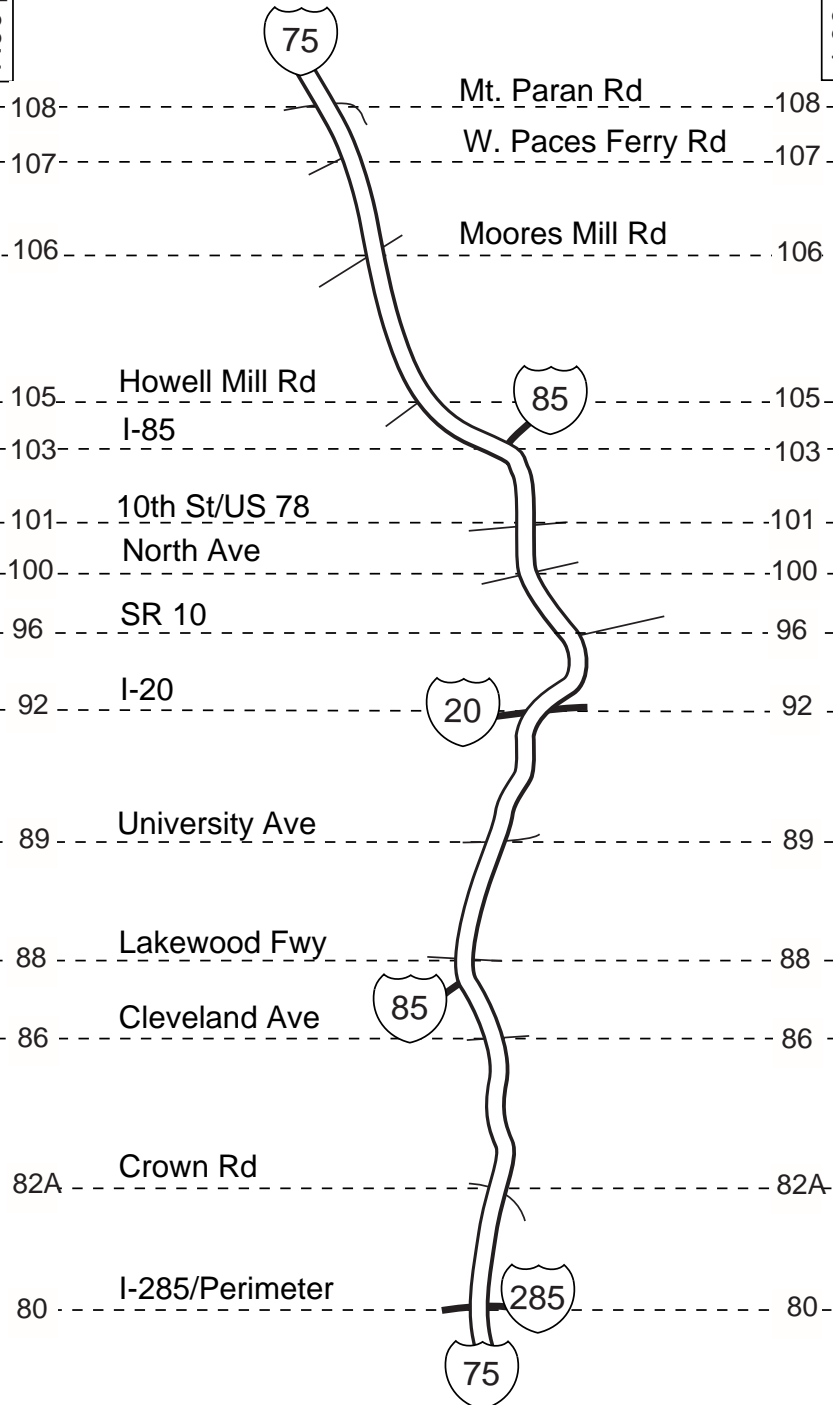


**I-75 (HOV)
EVENING (FALL 1998)**

SOUTHBOUND



4:00 p.m.	5:00 p.m.	6:00 p.m.	7:00 p.m.
A	A	A	
A	A	A	
A	A	A	
A	A	A	
A	A	A	
E	F (65)	F (45)	
F (50)	F (50)	E	
E	E	E	
E	E	D	
C	C	B	
A	B	A	
A	B	A	
A	A	A	
A	A	A	
A	A	A	
A	A	A	
HOV LANE			

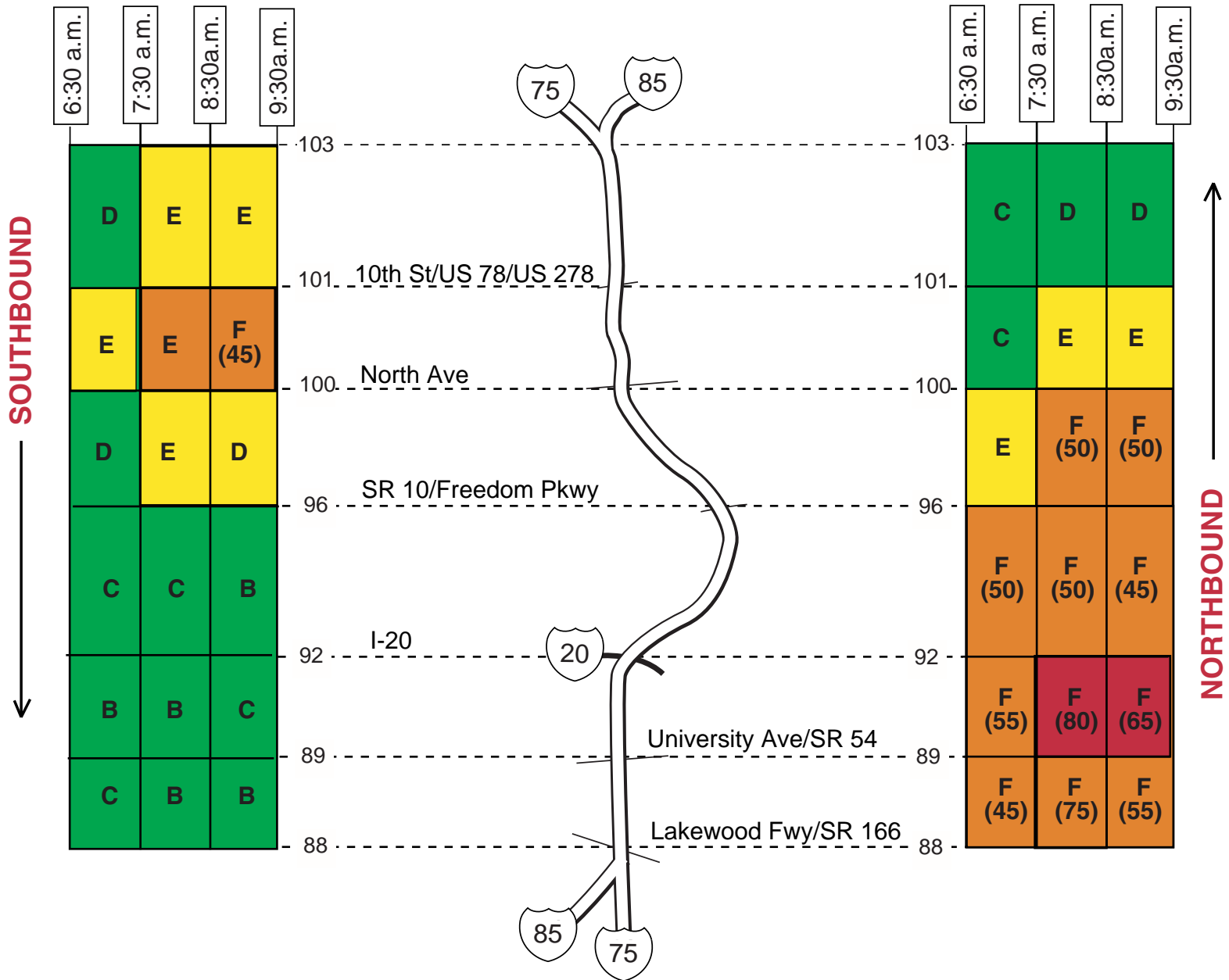


4:00 p.m.	5:00 p.m.	6:00 p.m.	7:00 p.m.
C	B	A	
B	A	A	
A	A	A	
A	A	A	
A	A	A	
A	B	A	
B	B	C	
B	B	B	
B	B	A	
B	A	A	
A	A	A	
A	A	A	
A	A	A	
A	A	A	
A	A	A	
HOV LANE			

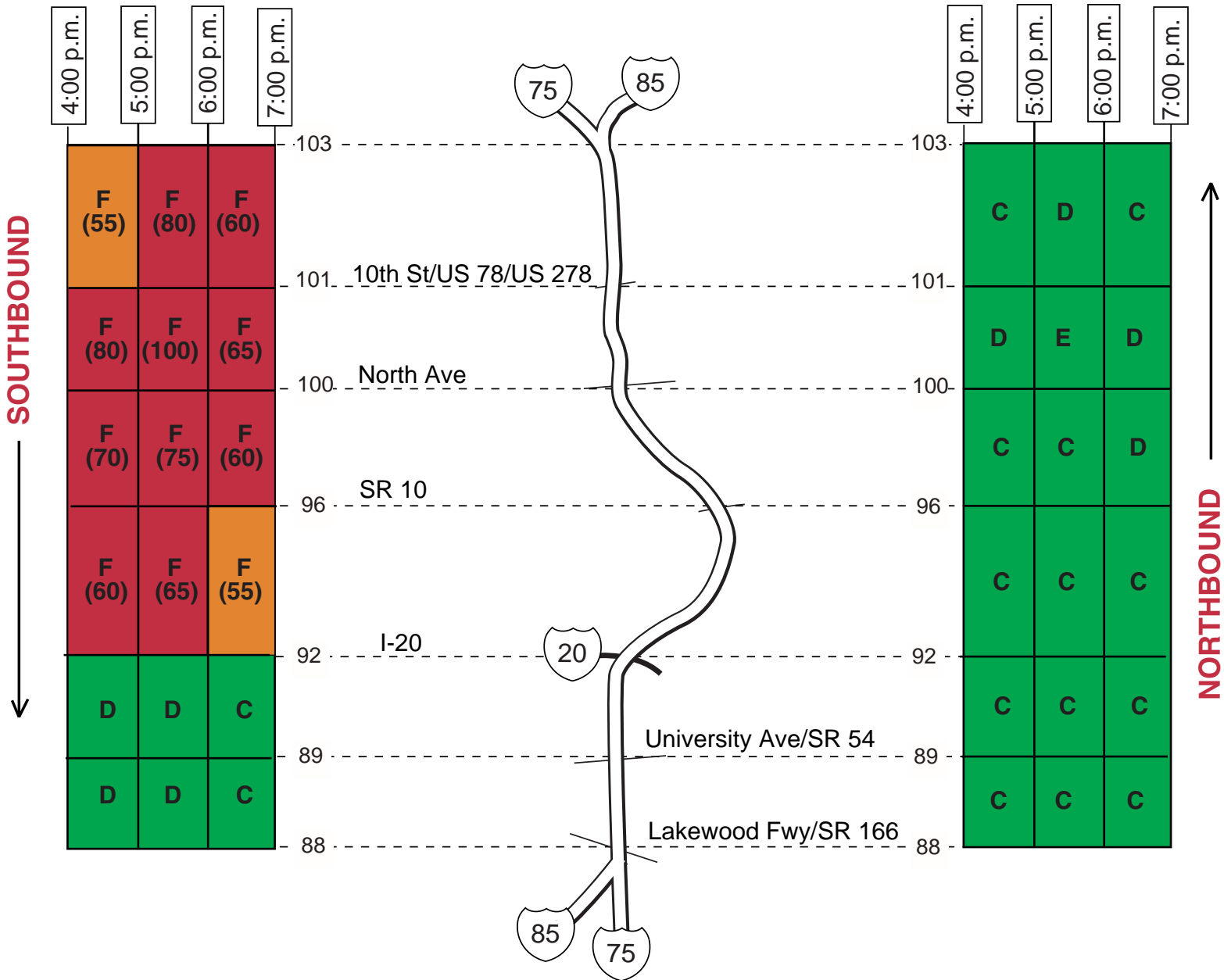


NORTHBOUND

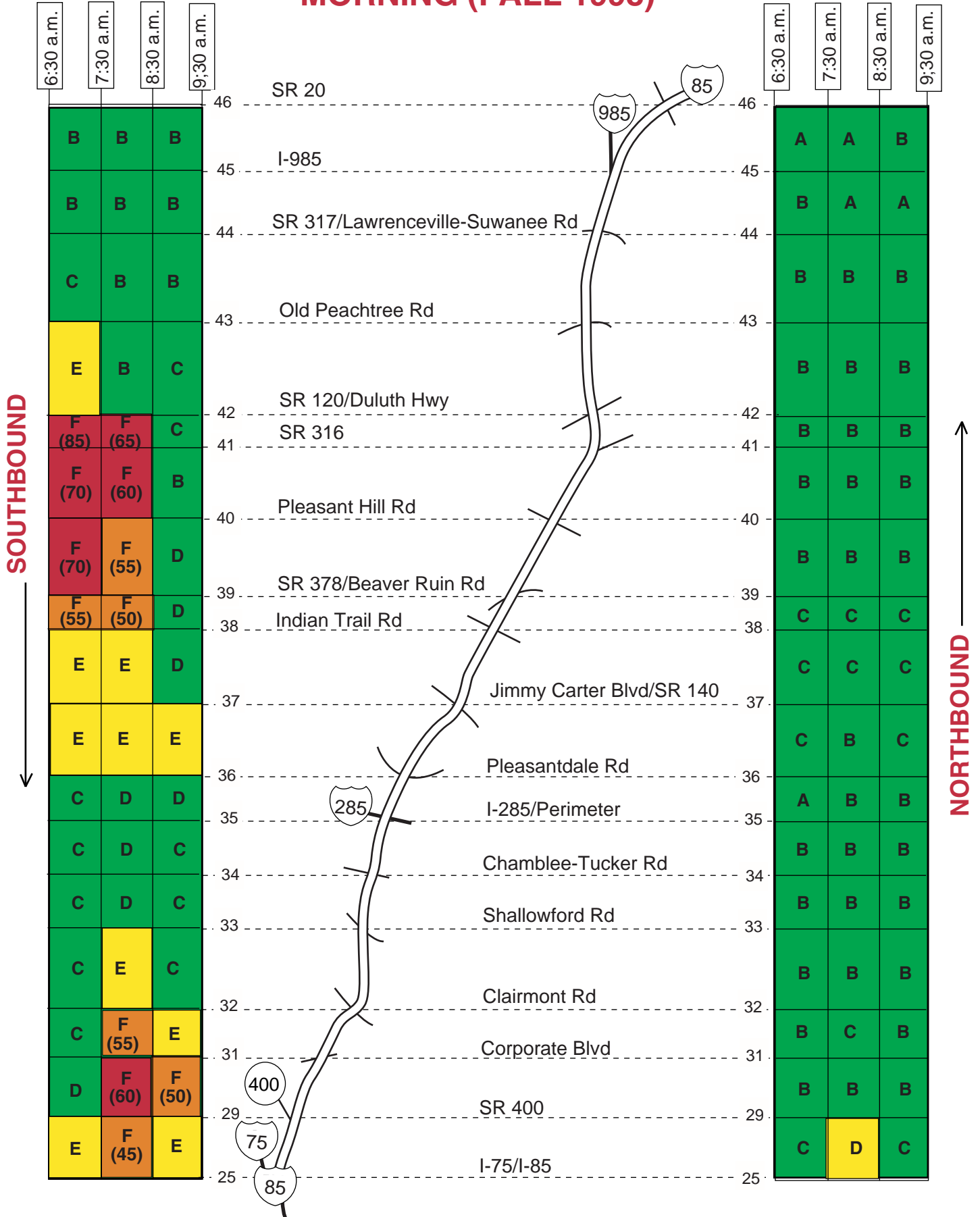
I-75 / 85
MORNING (FALL 1998)



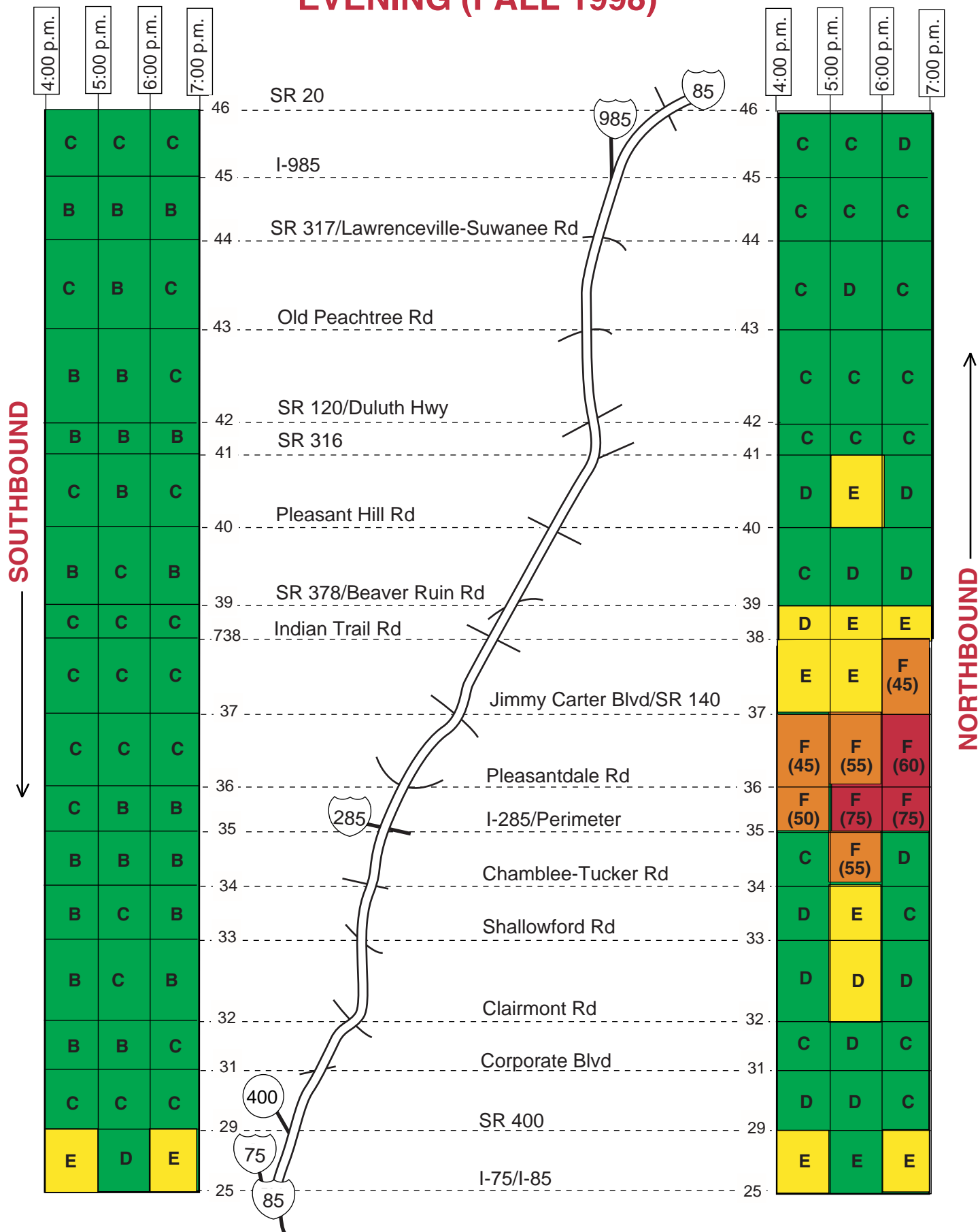
I-75 / 85
EVENING (FALL 1998)



I-85 (NORTH) MORNING (FALL 1998)



I-85 (NORTH) EVENING (FALL 1998)

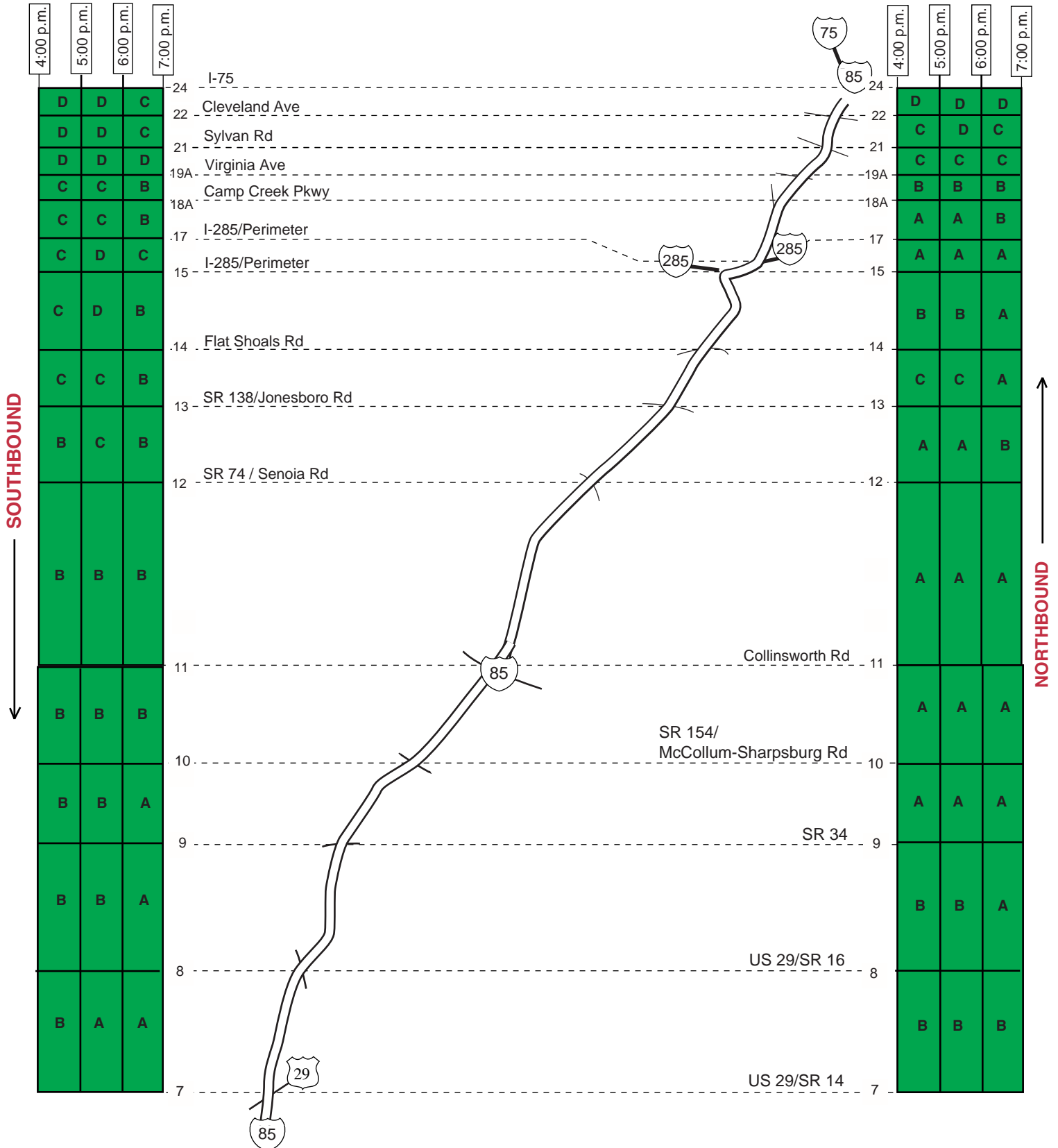


The map displays traffic conditions for the Atlanta area, focusing on the I-75, I-285, and I-85 corridor. The data is presented in a grid format, with rows representing different time slots (6:30 a.m., 7:30 a.m., 8:30 a.m., 9:30 a.m.) and columns representing different directions (Southbound and Northbound). The map also shows the locations of major highways and surrounding roads.

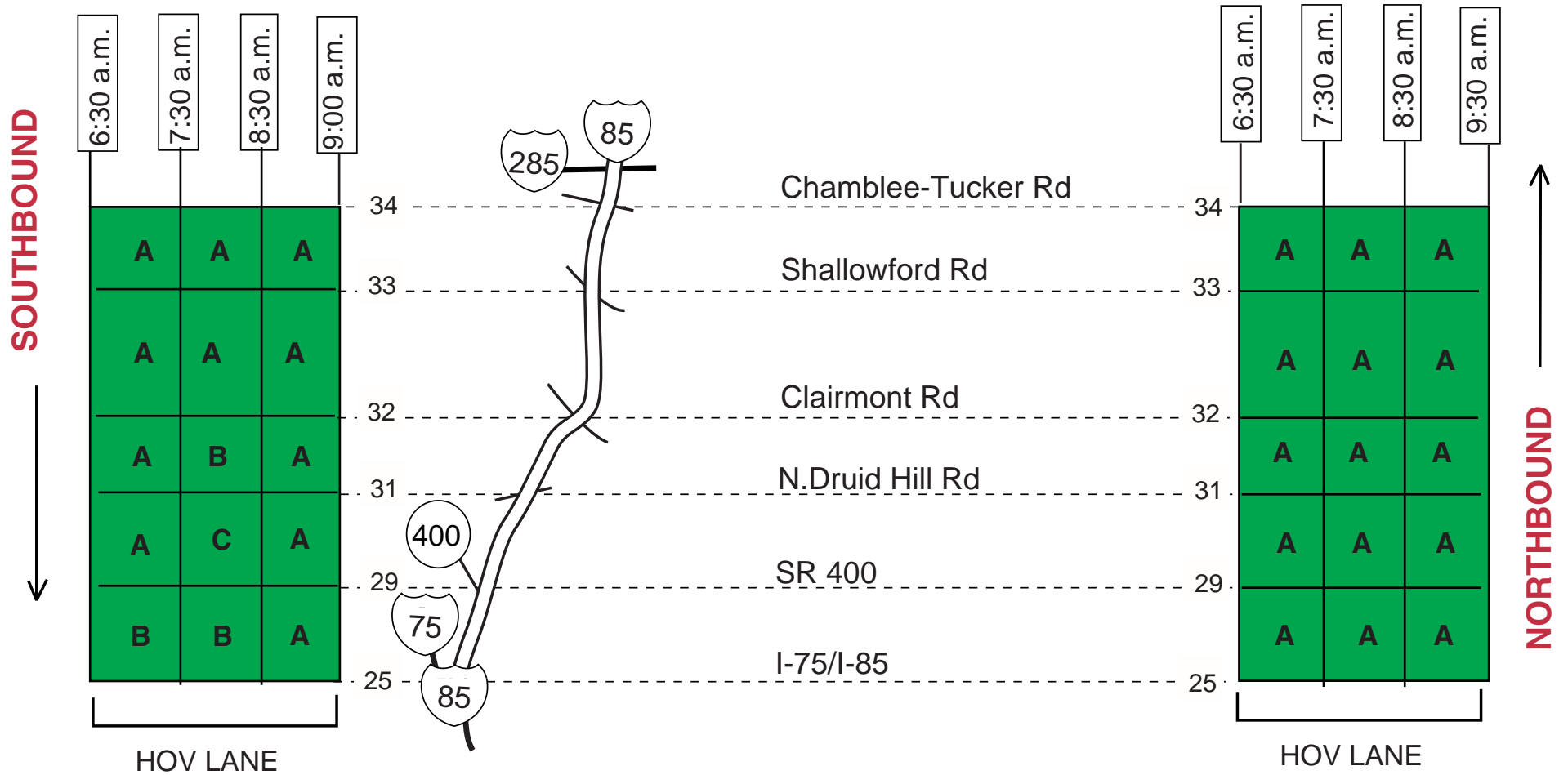
Time Slot	Southbound	Northbound
6:30 a.m.	C	F (45)
7:30 a.m.	C	E
8:30 a.m.	B	C
9:30 a.m.	B	C

The map also shows the locations of major highways and surrounding roads, including I-75, I-285, I-85, SR 154/McCollum-Sharpburg Rd, SR 34, US 29/SR 16, and US 29/SR 14.

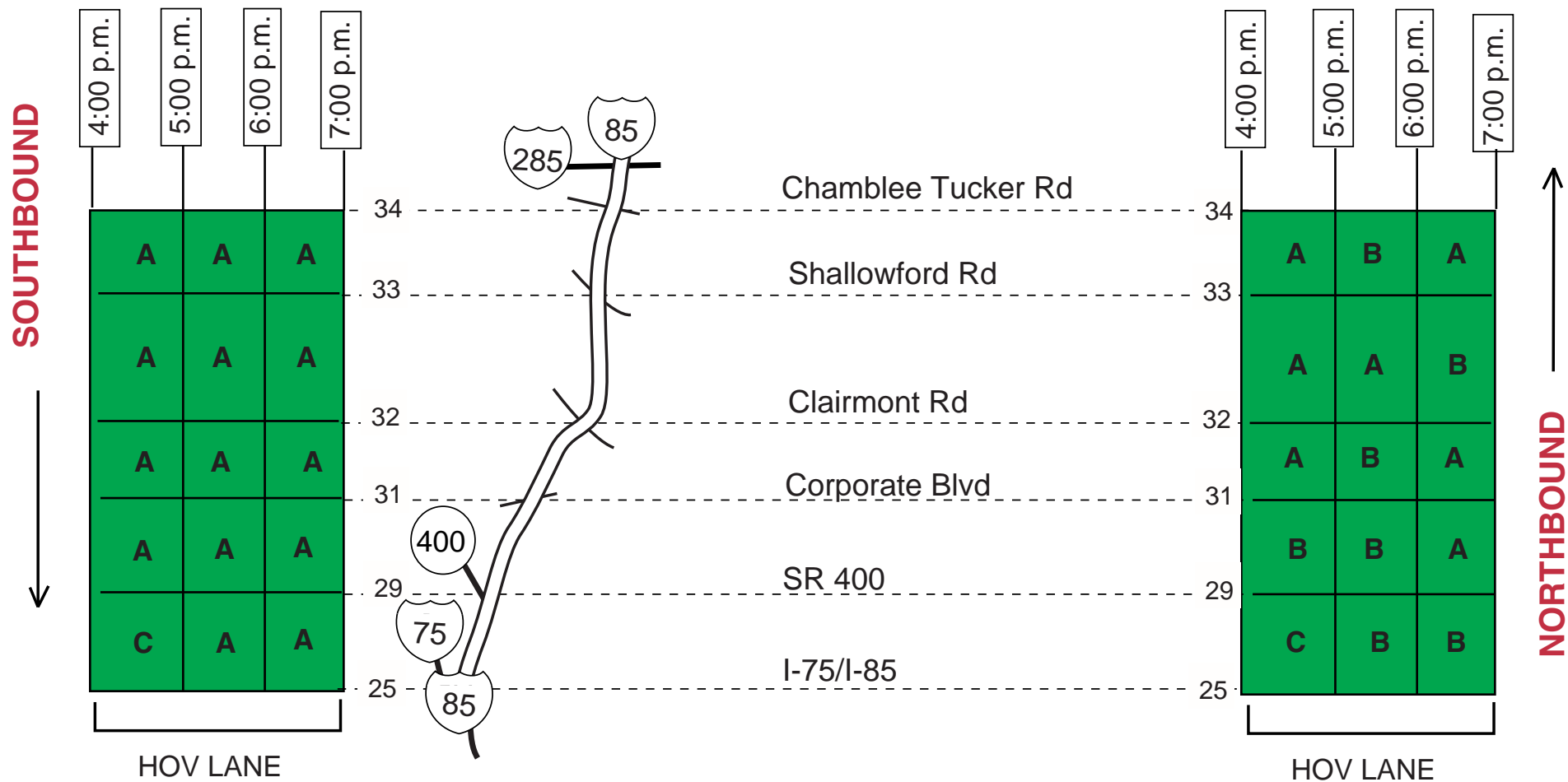
I-85 (SOUTH) EVENING (FALL 1998)

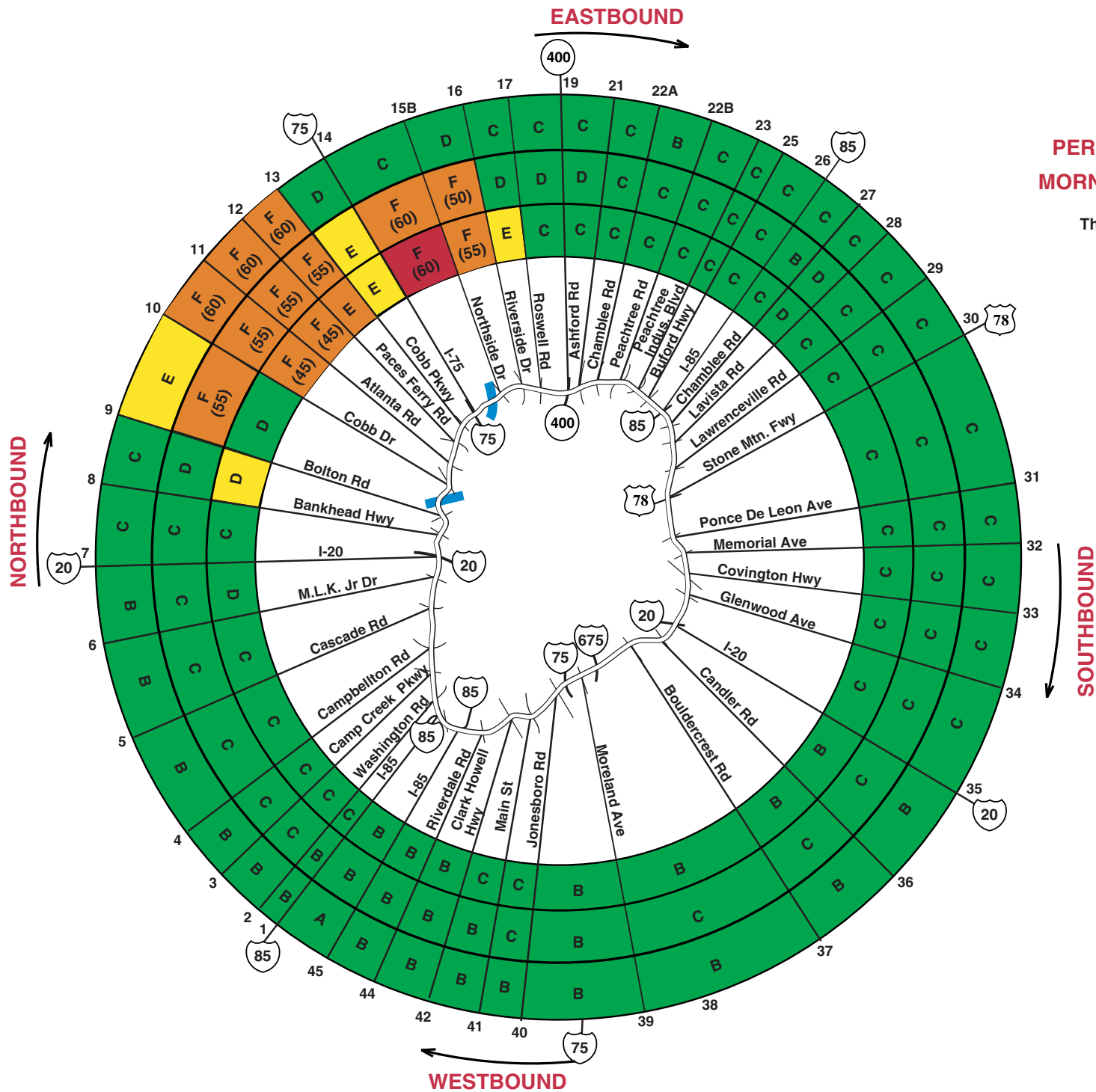


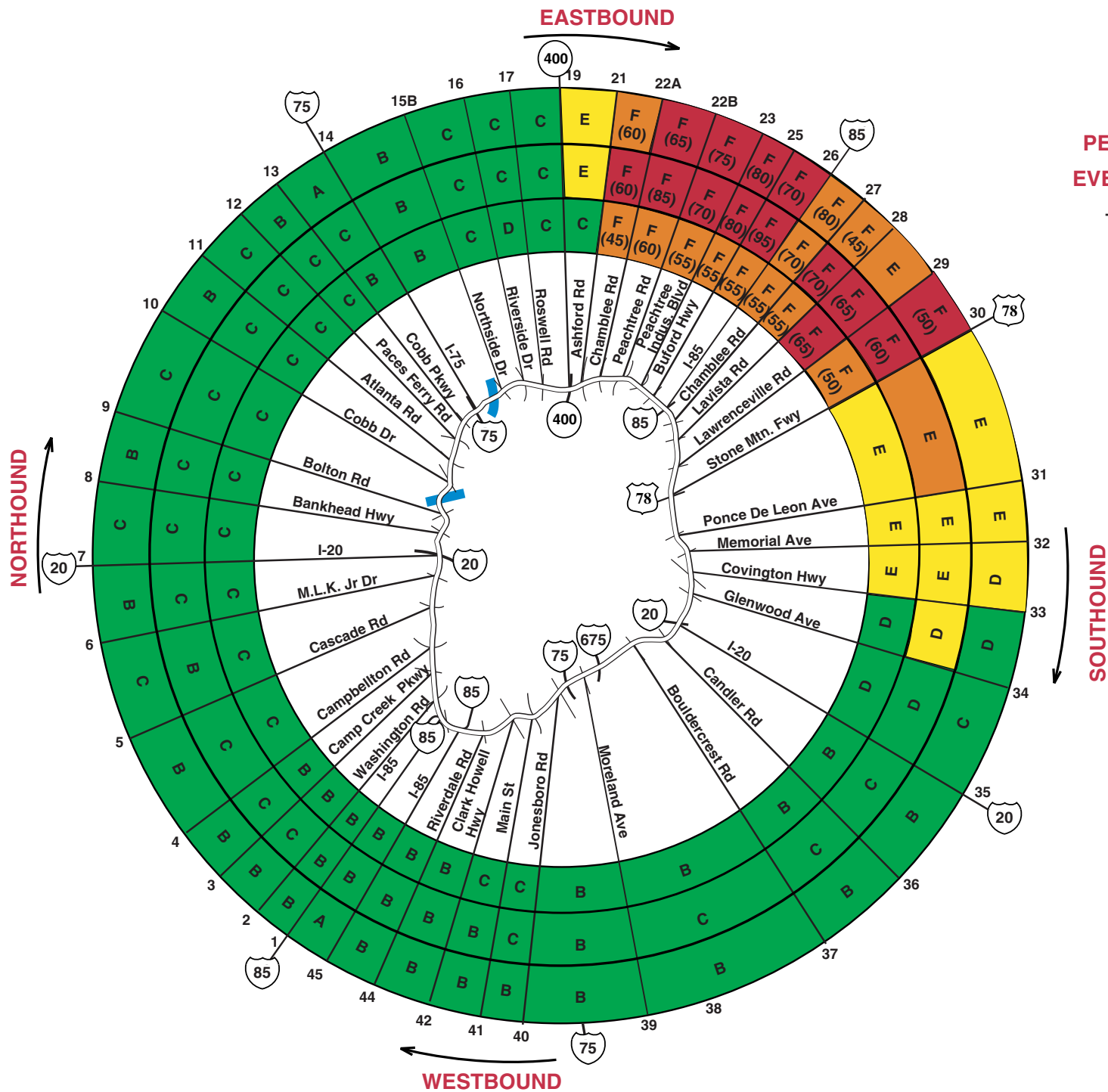
I-85 HOV MORNING (FALL 1998)

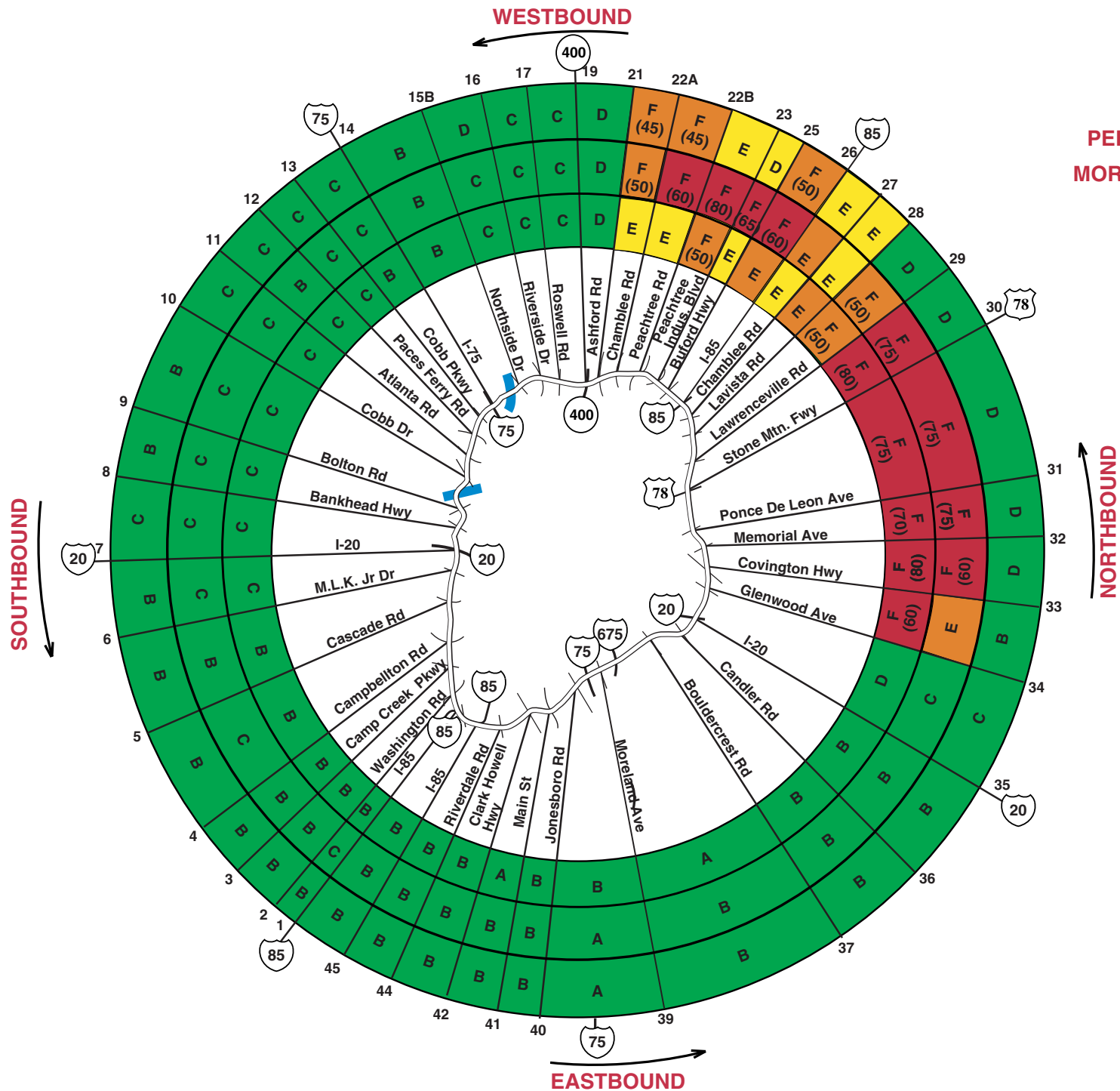


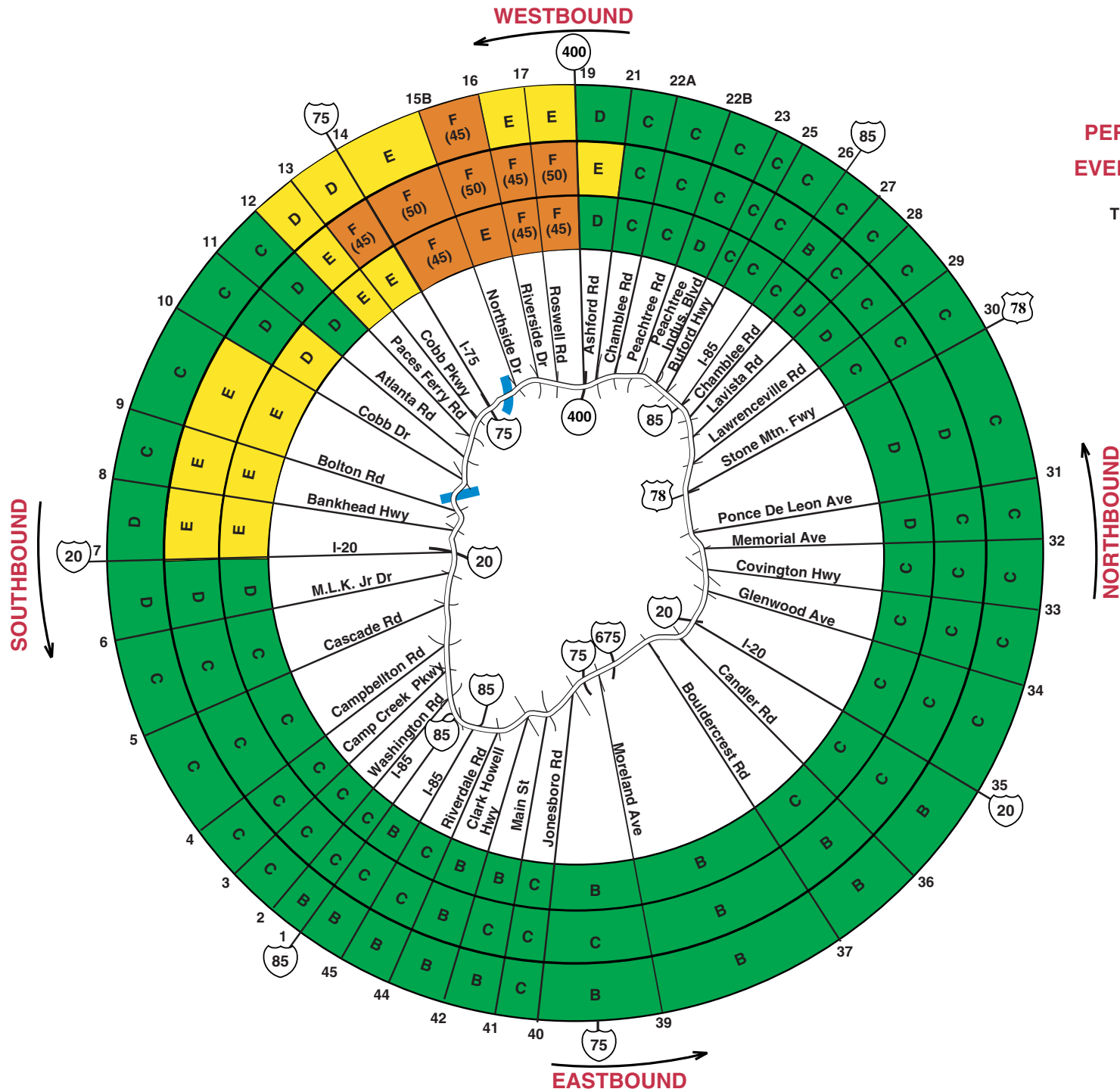
I-85 HOV EVENING (FALL 1998)



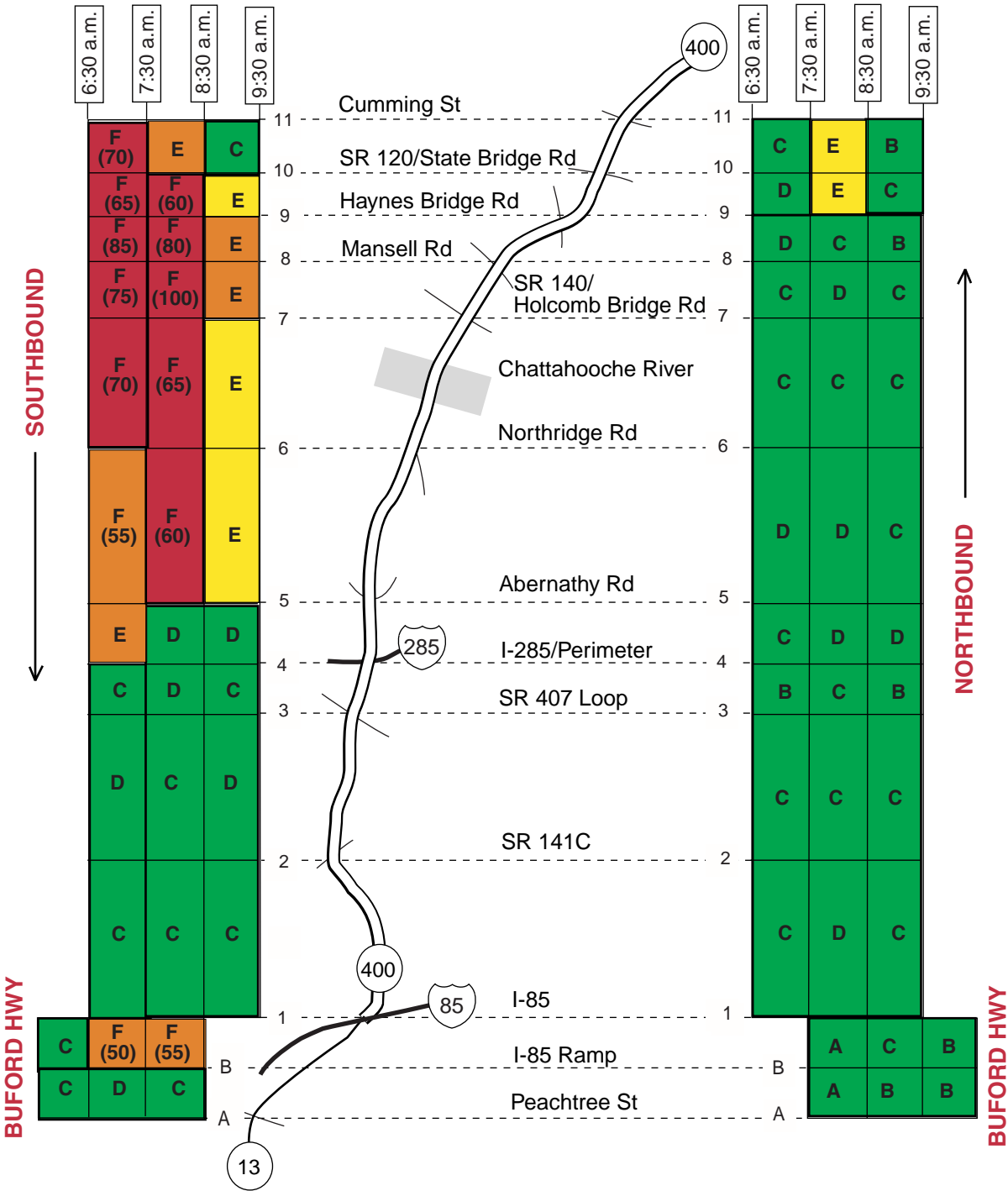




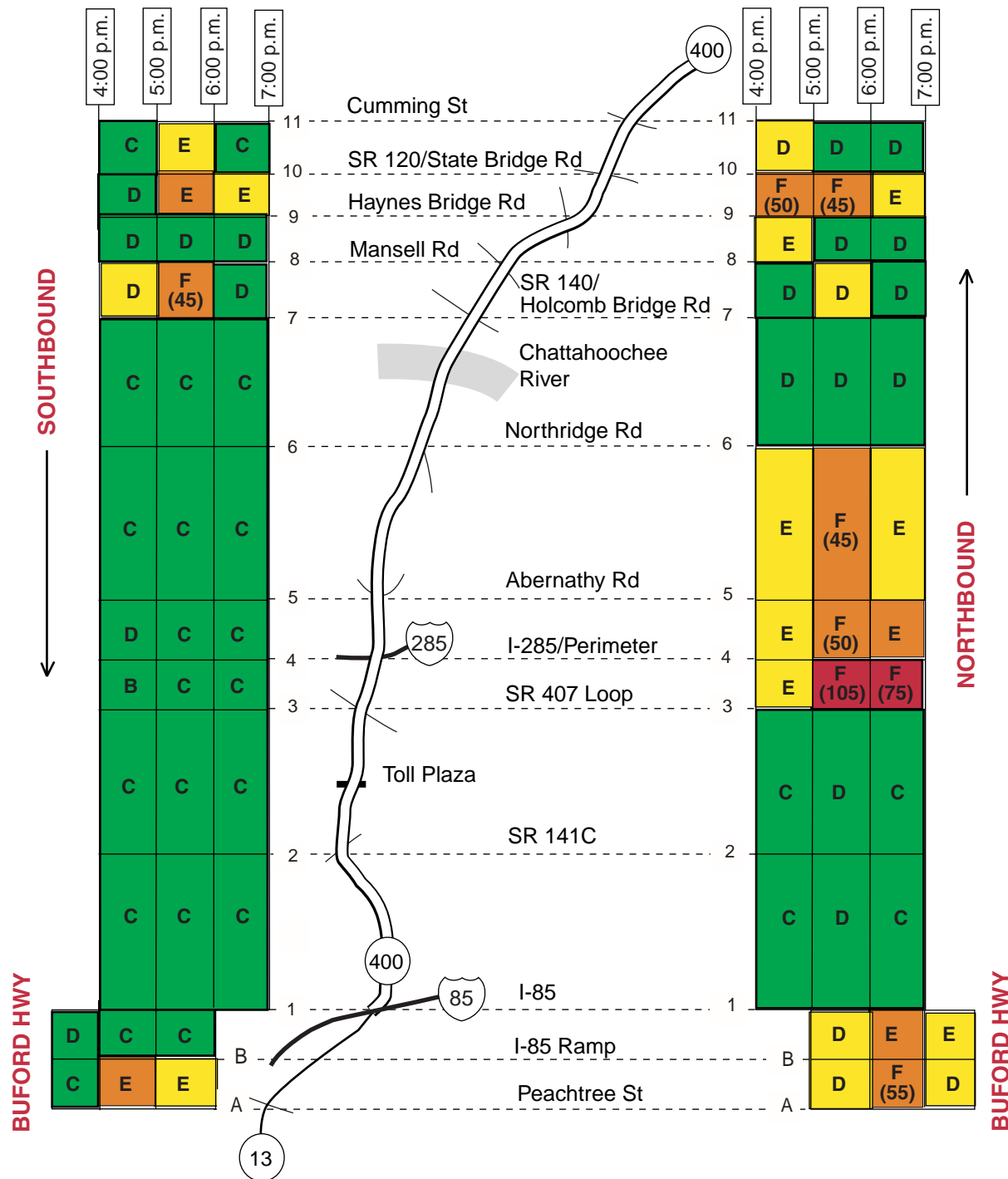




**SR 400
MORNING (FALL 1998)**

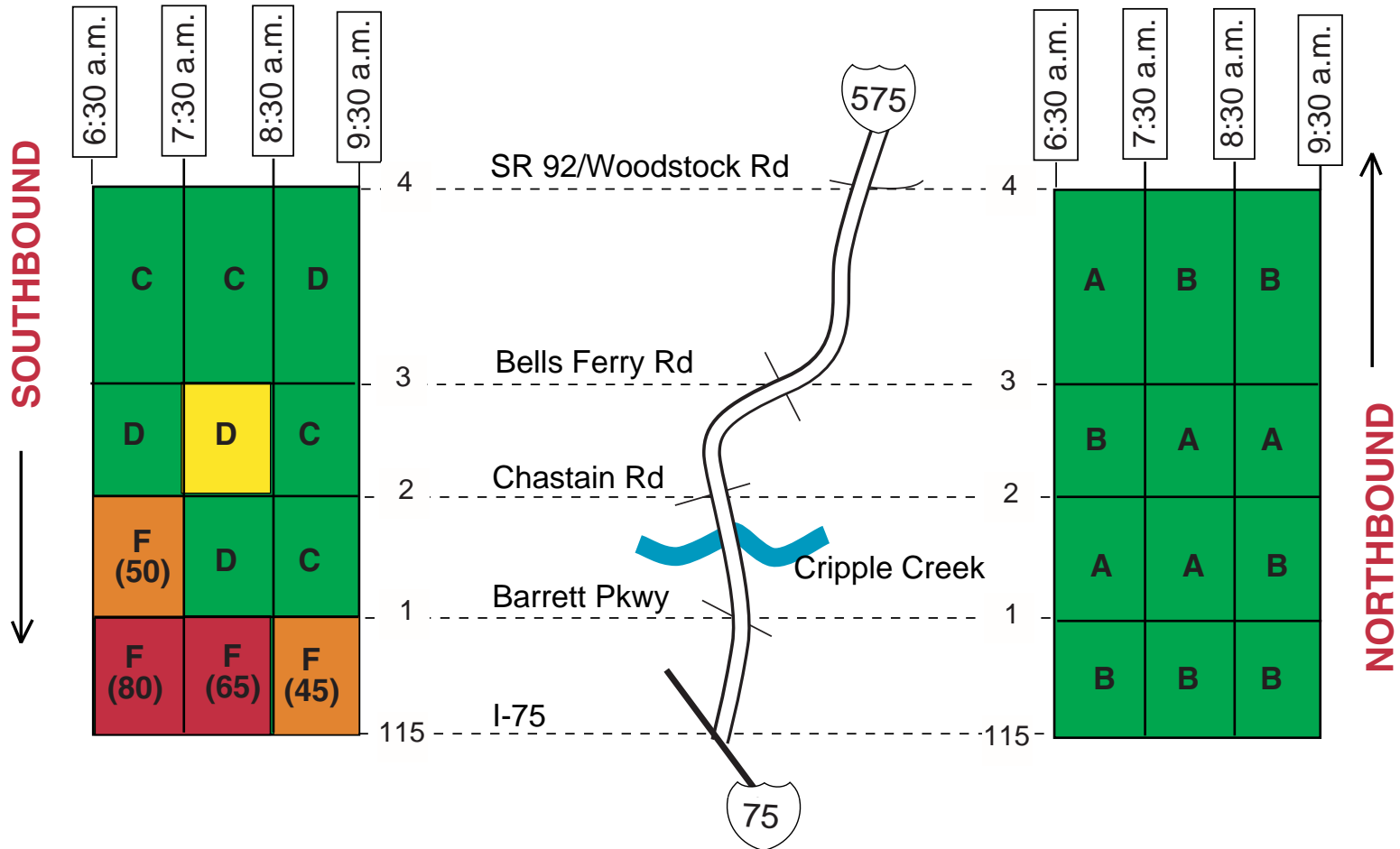


SR 400 EVENING (FALL 1998)

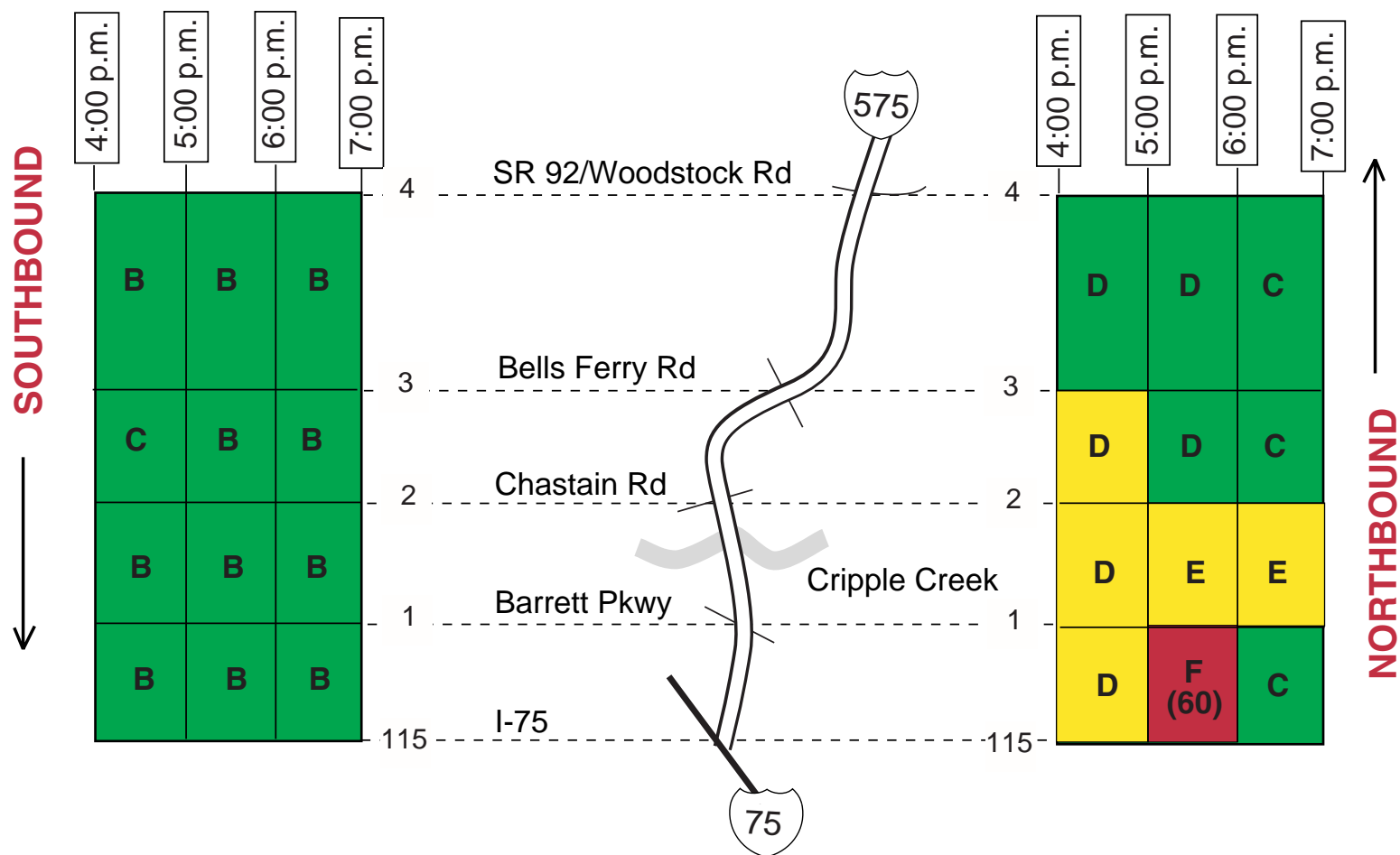


I-575

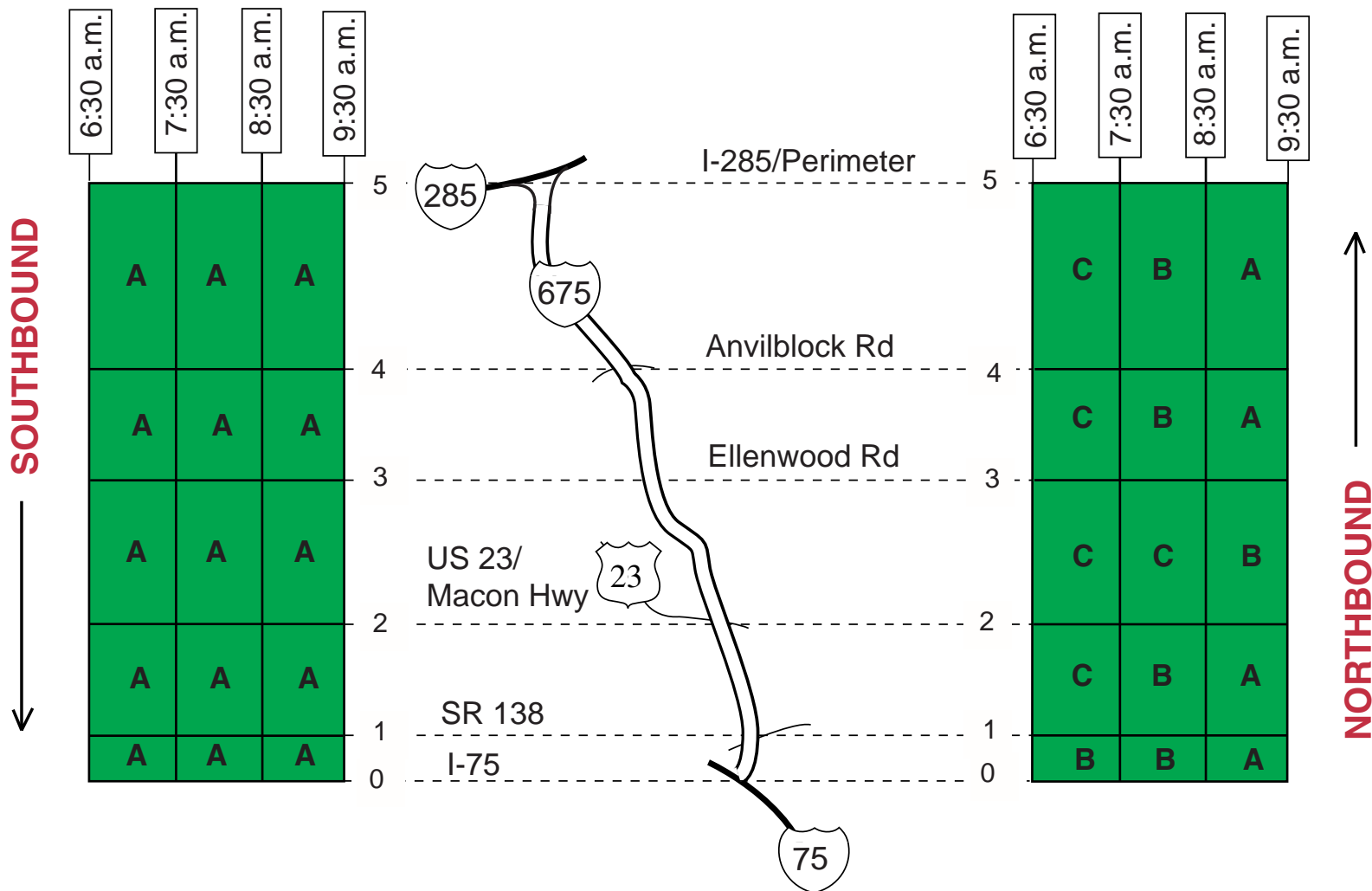
MORNING (FALL 1998)



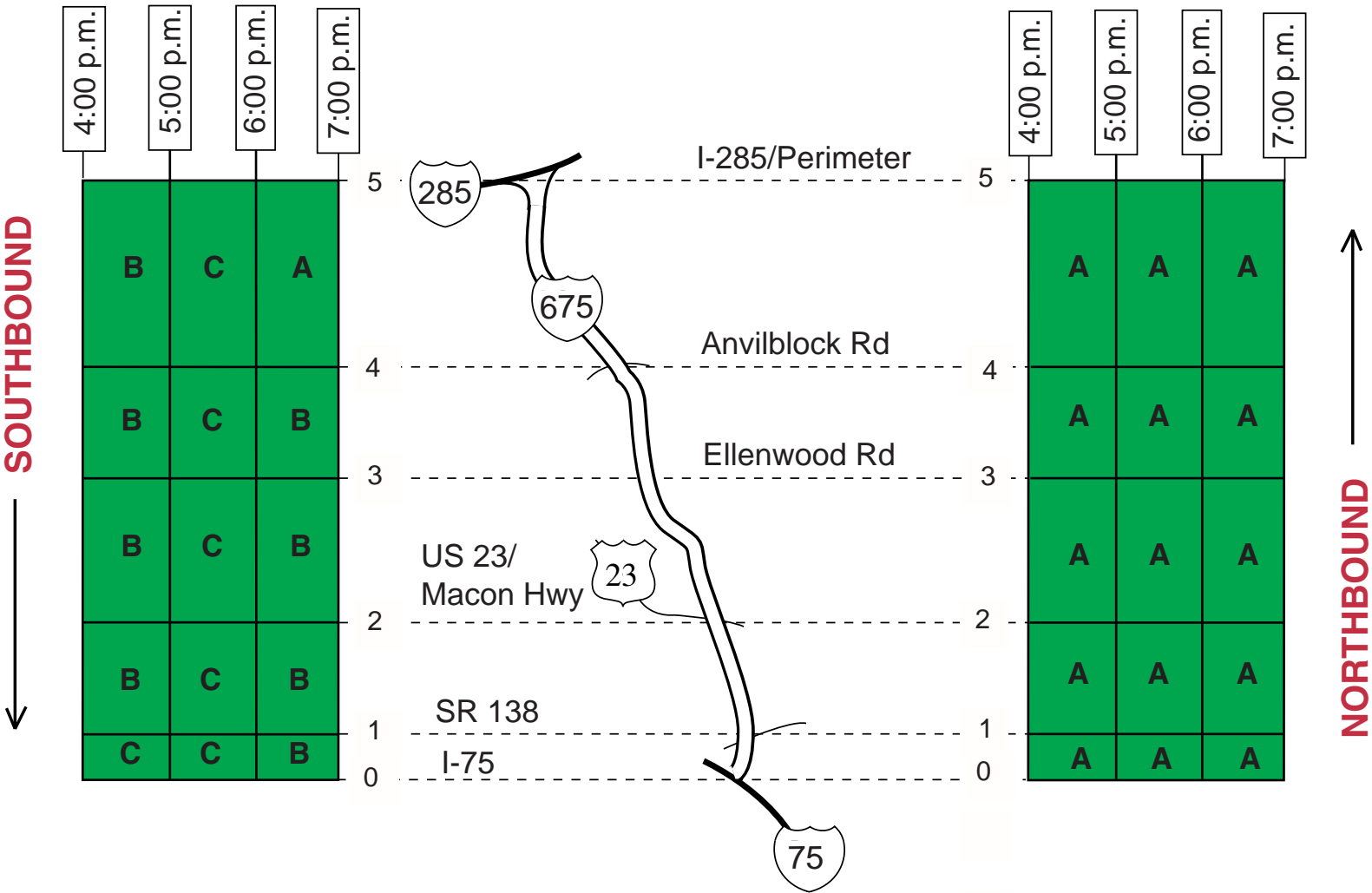
I-575
EVENING (FALL 1998)



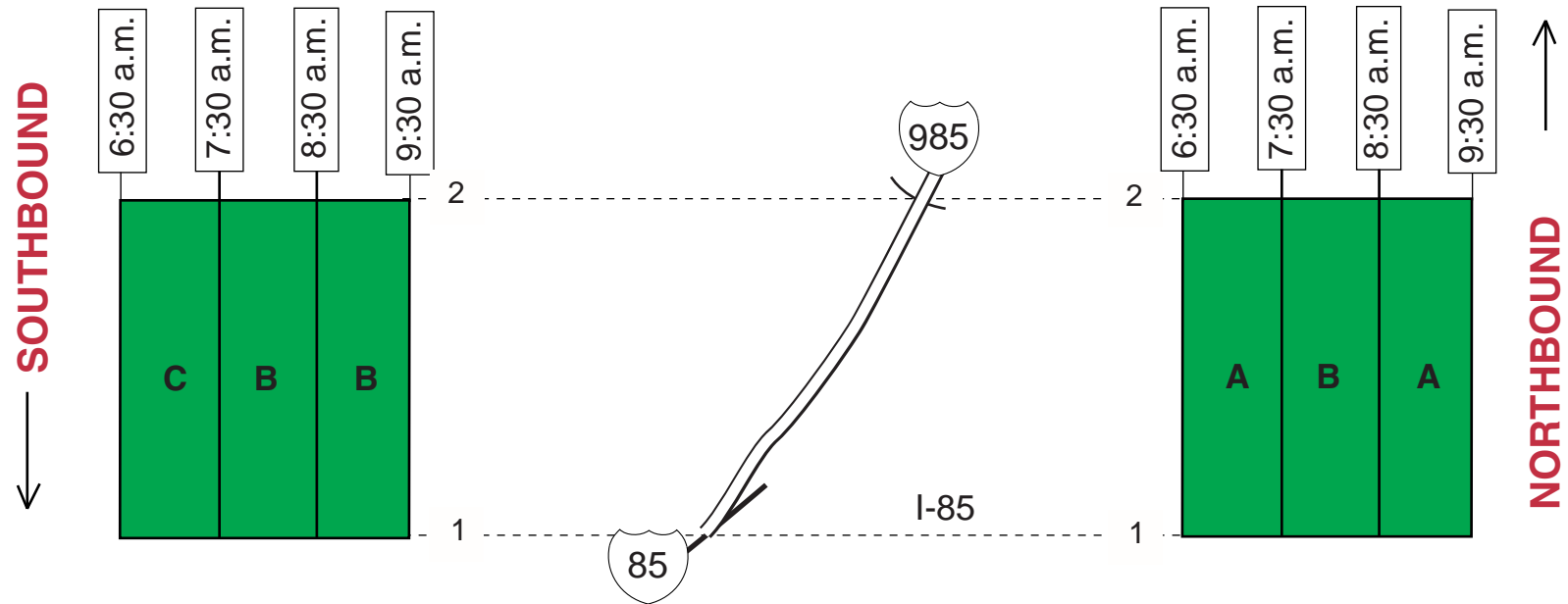
I-675
MORNING (FALL 1998)



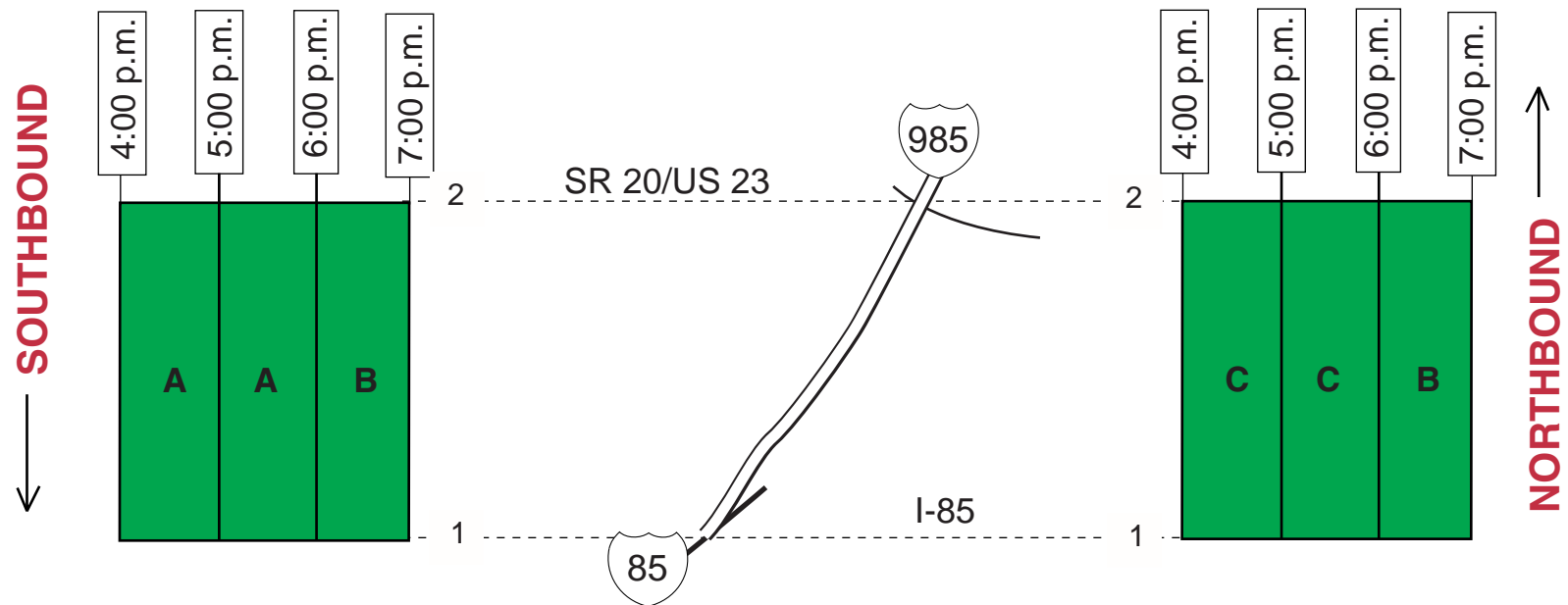
I-675
EVENING (FALL 1998)



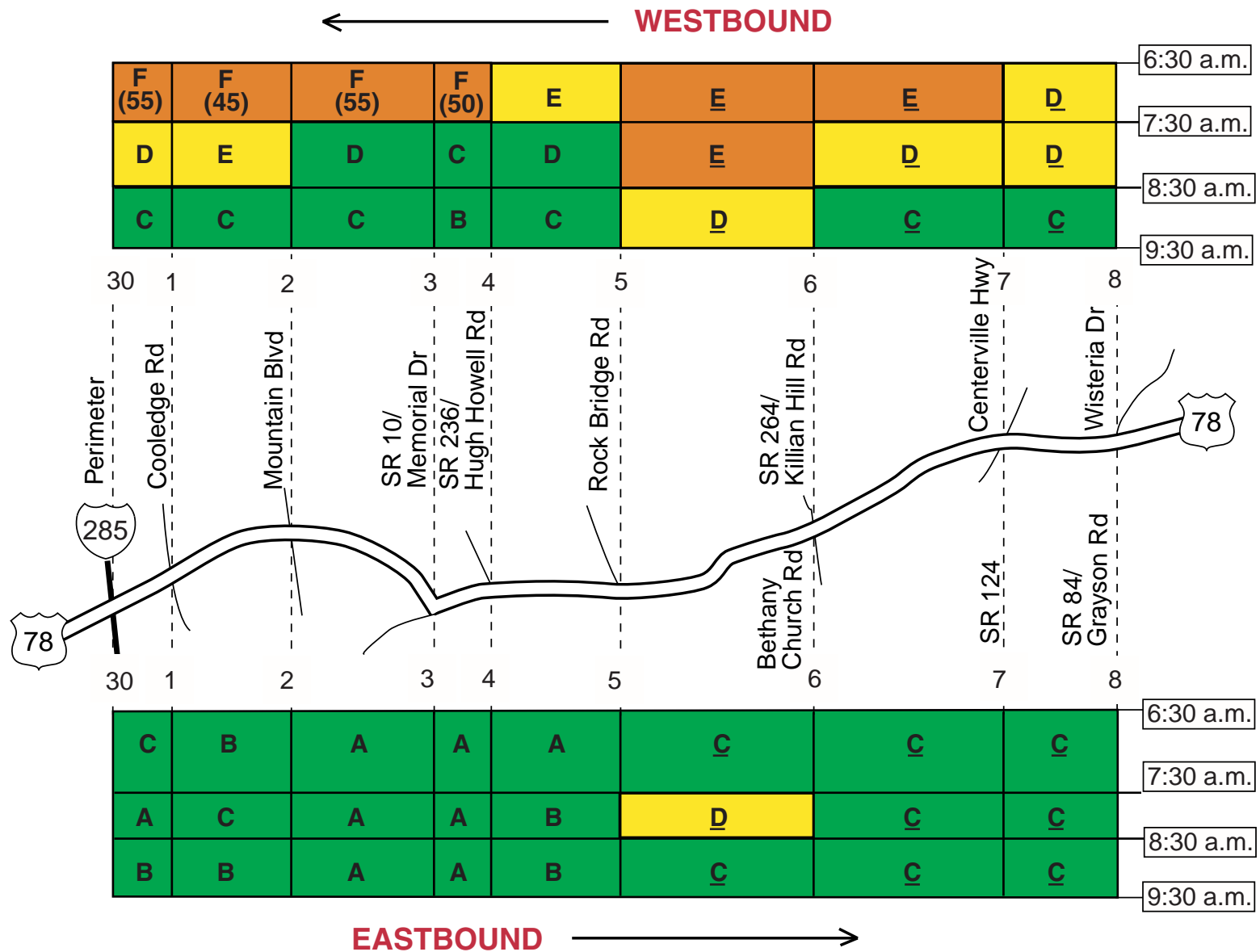
I-985
MORNING (FALL 1998)



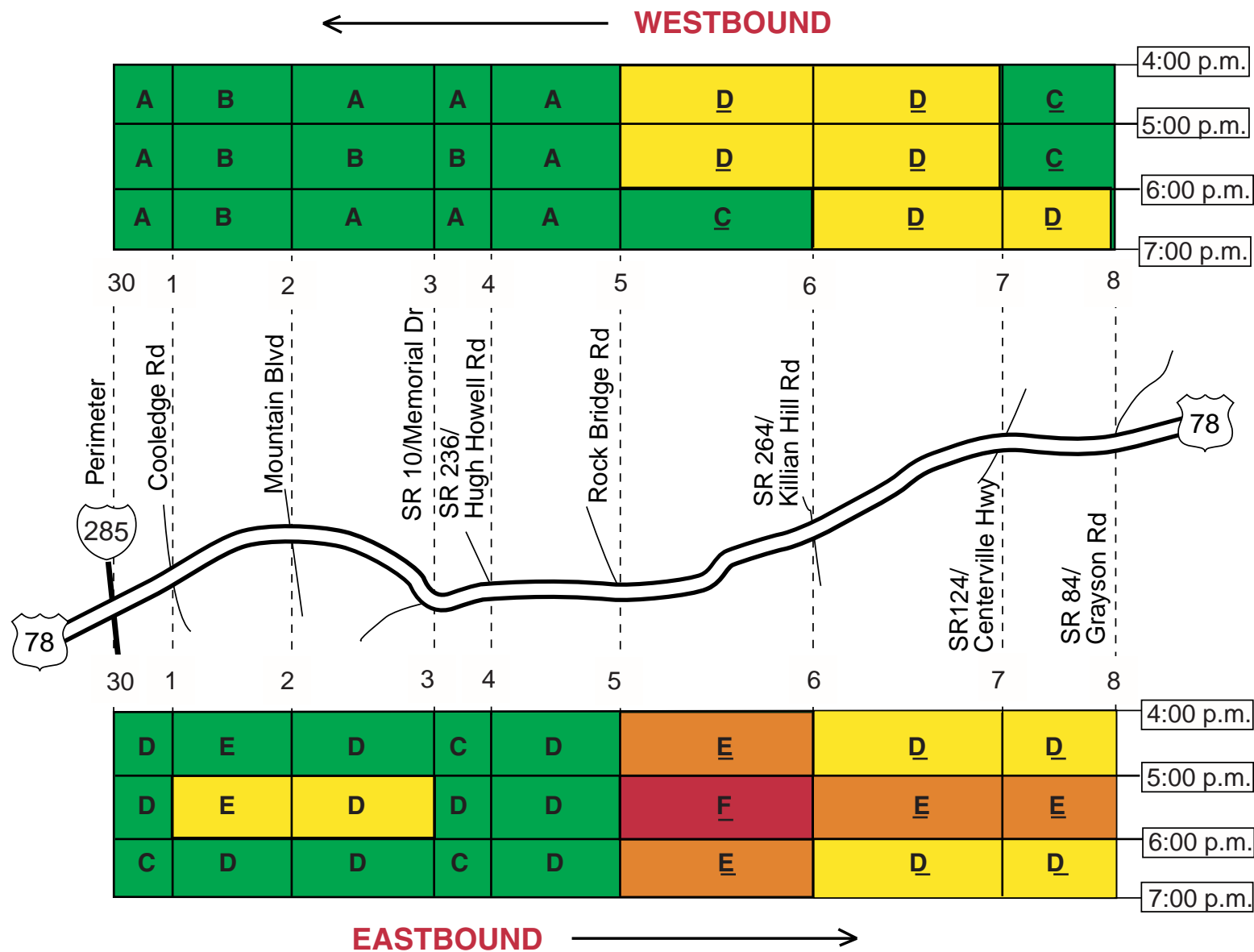
I-985 EVENING (FALL 1998)



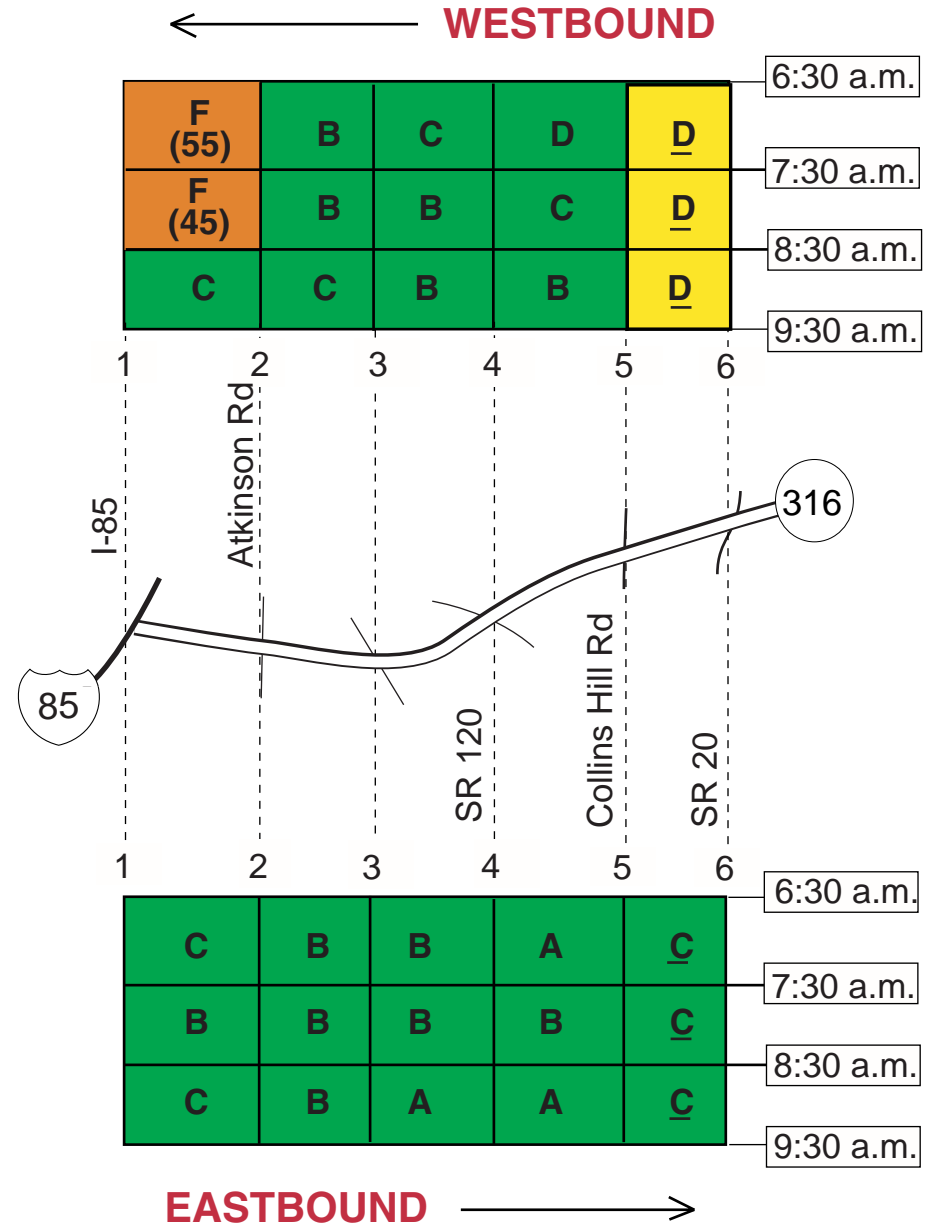
US 78 (STONE MOUNTAIN FWY) MORNING (FALL 1998)



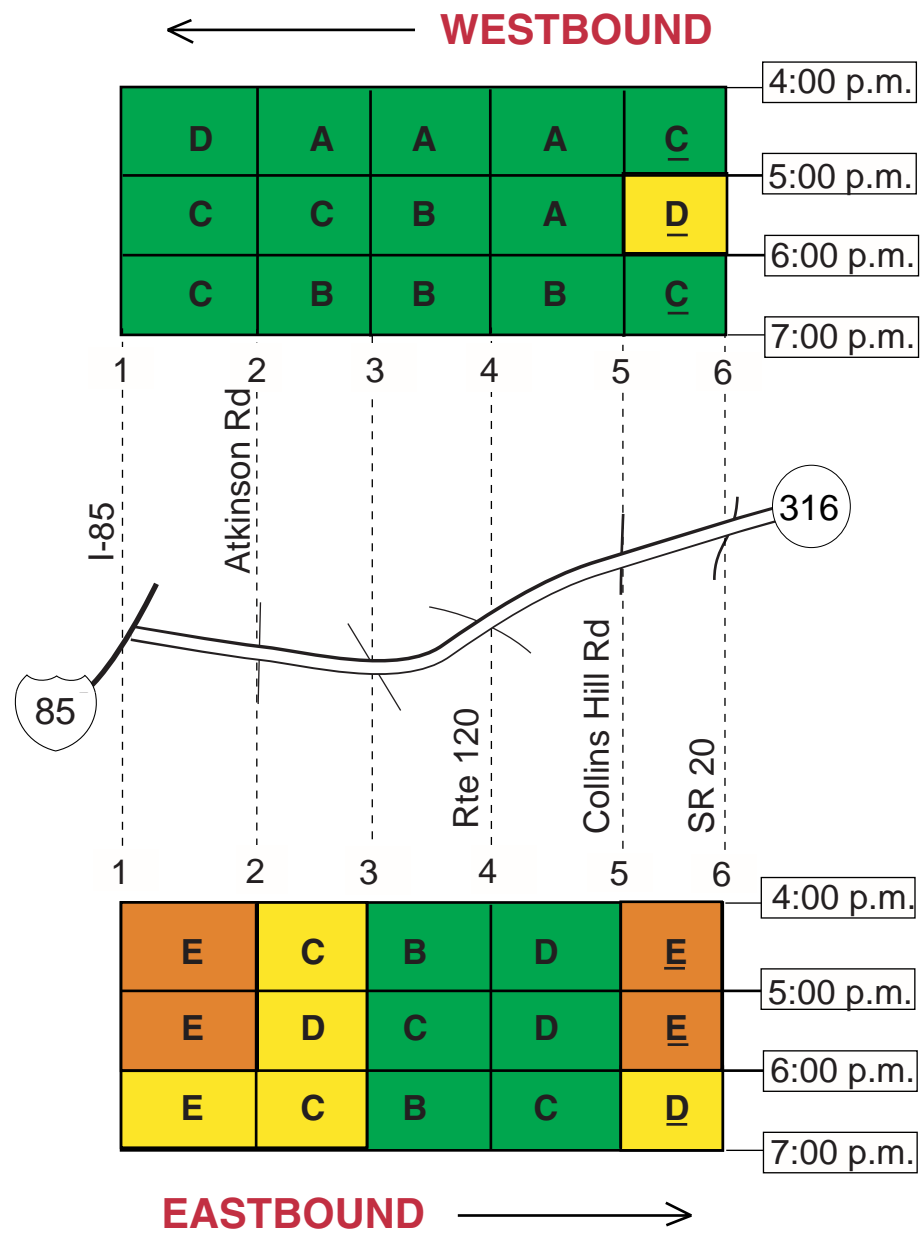
US 78 (STONE MOUNTAIN FWY) EVENING (FALL 1998)



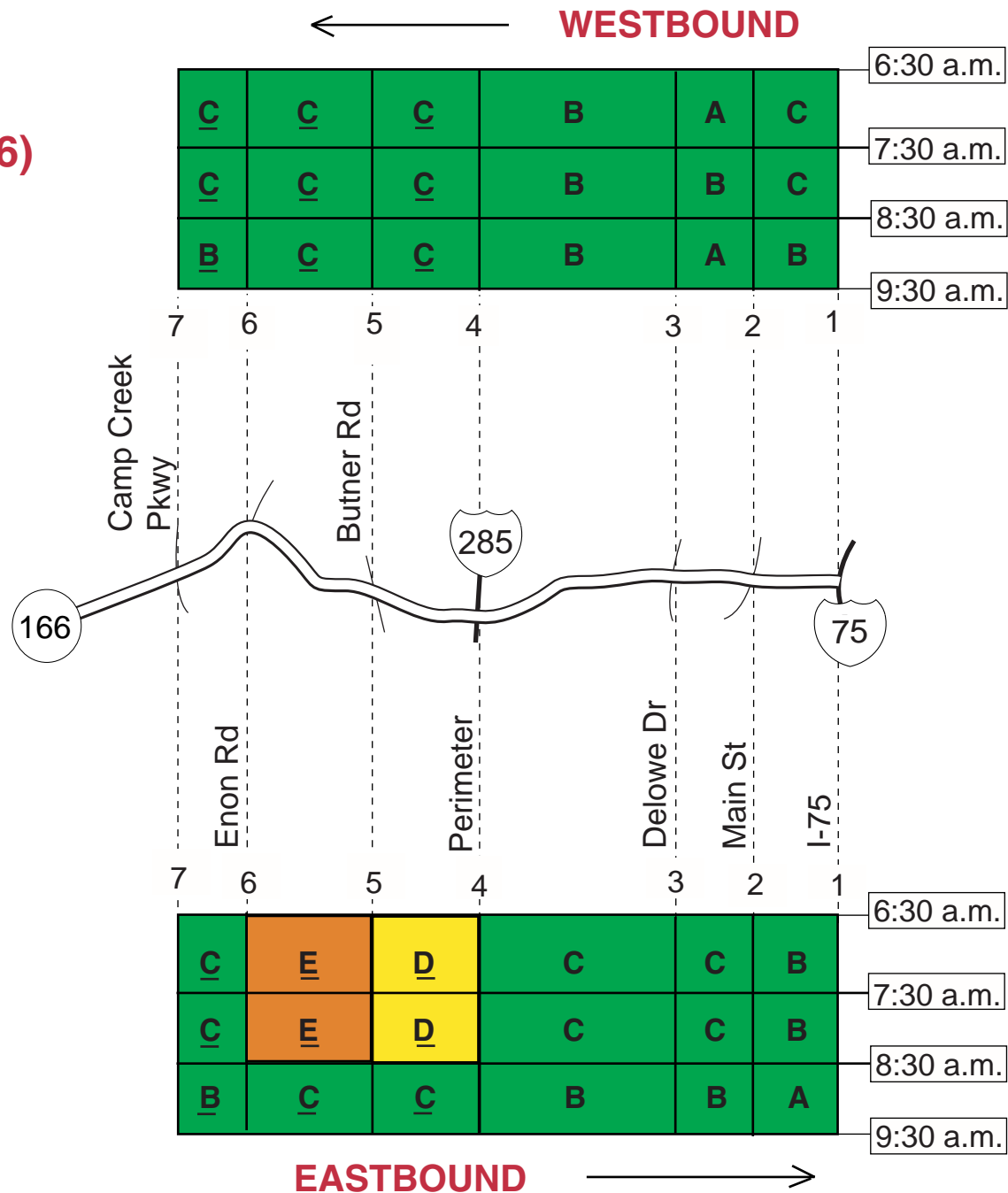
SR 316
(Gwinnett County)
MORNING (FALL 1998)



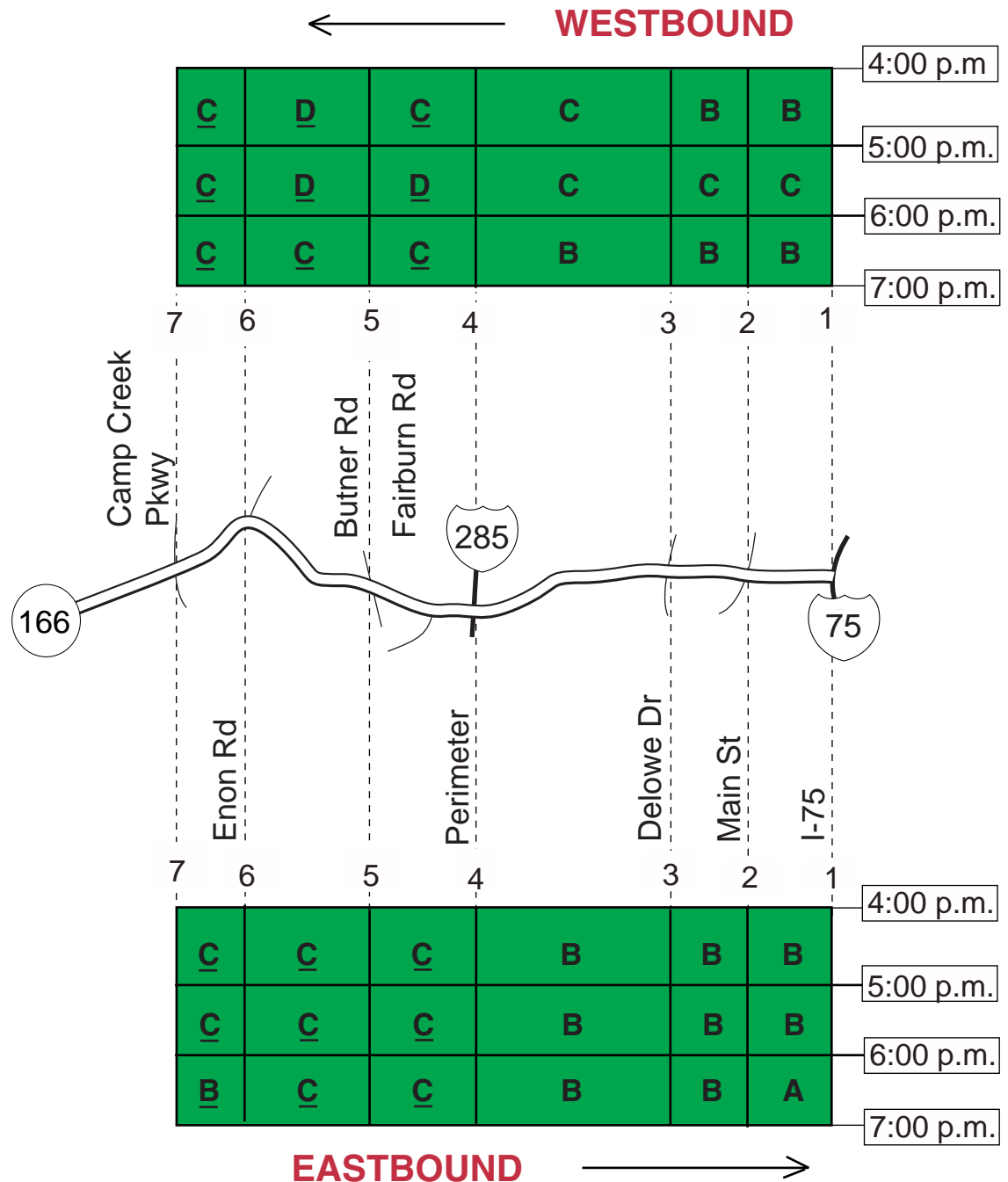
SR 316
(Gwinnett County)
EVENING (FALL 1998)



**CAMPBELLTON RD /
LAKEWOOD FWY (SR 166)
(Fulton County)
MORNING (FALL 1998)**



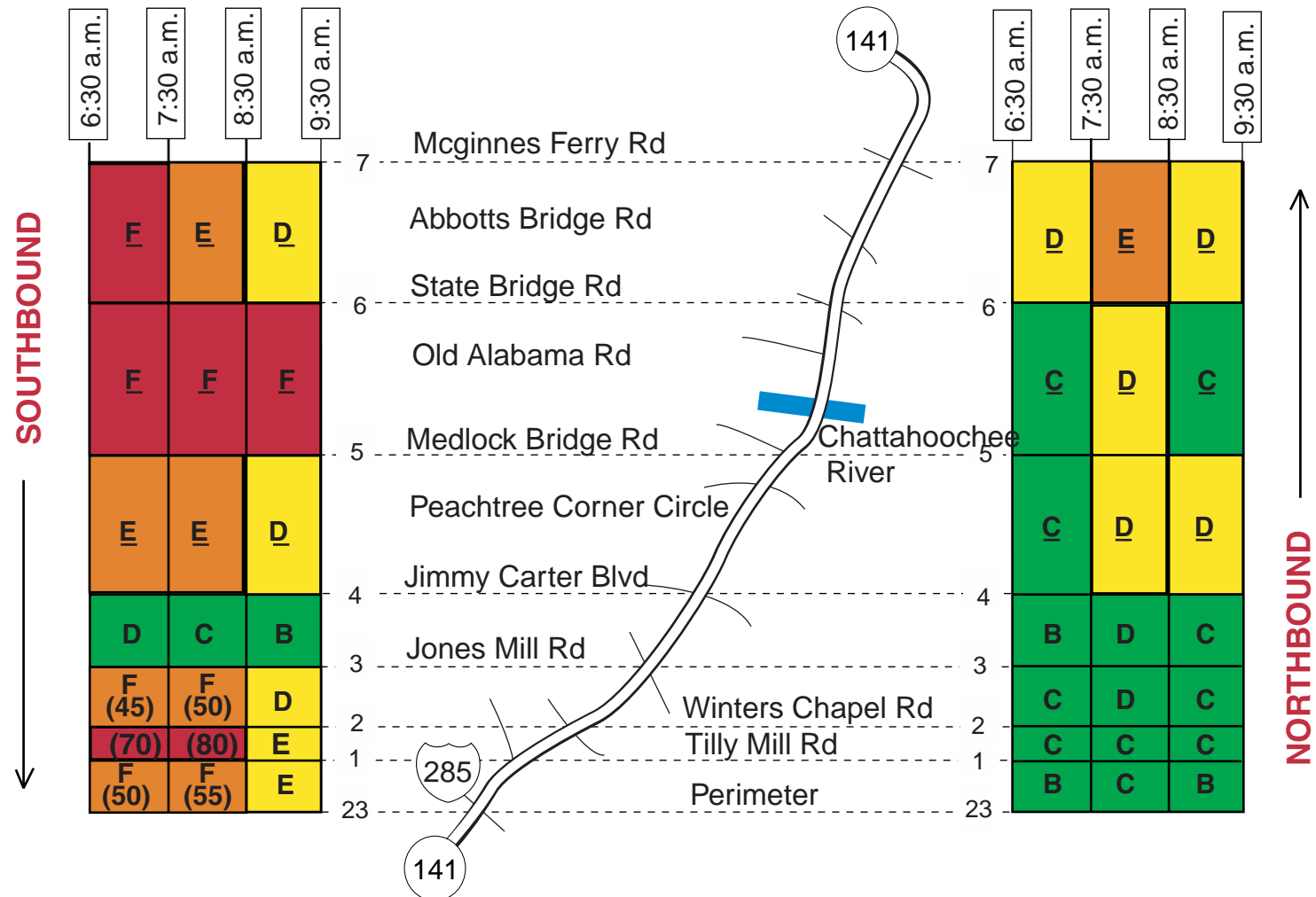
**CAMPBELLTON RD /
LAKEWOOD FWY (SR 166)
(Fulton County)
EVENING (FALL 1998)**



PEACHTREE IND. BLVD - PKWY / MEDLOCK BRIDGE RD (SR 141)

(Fulton / Gwinnett / Dekalb Co.)

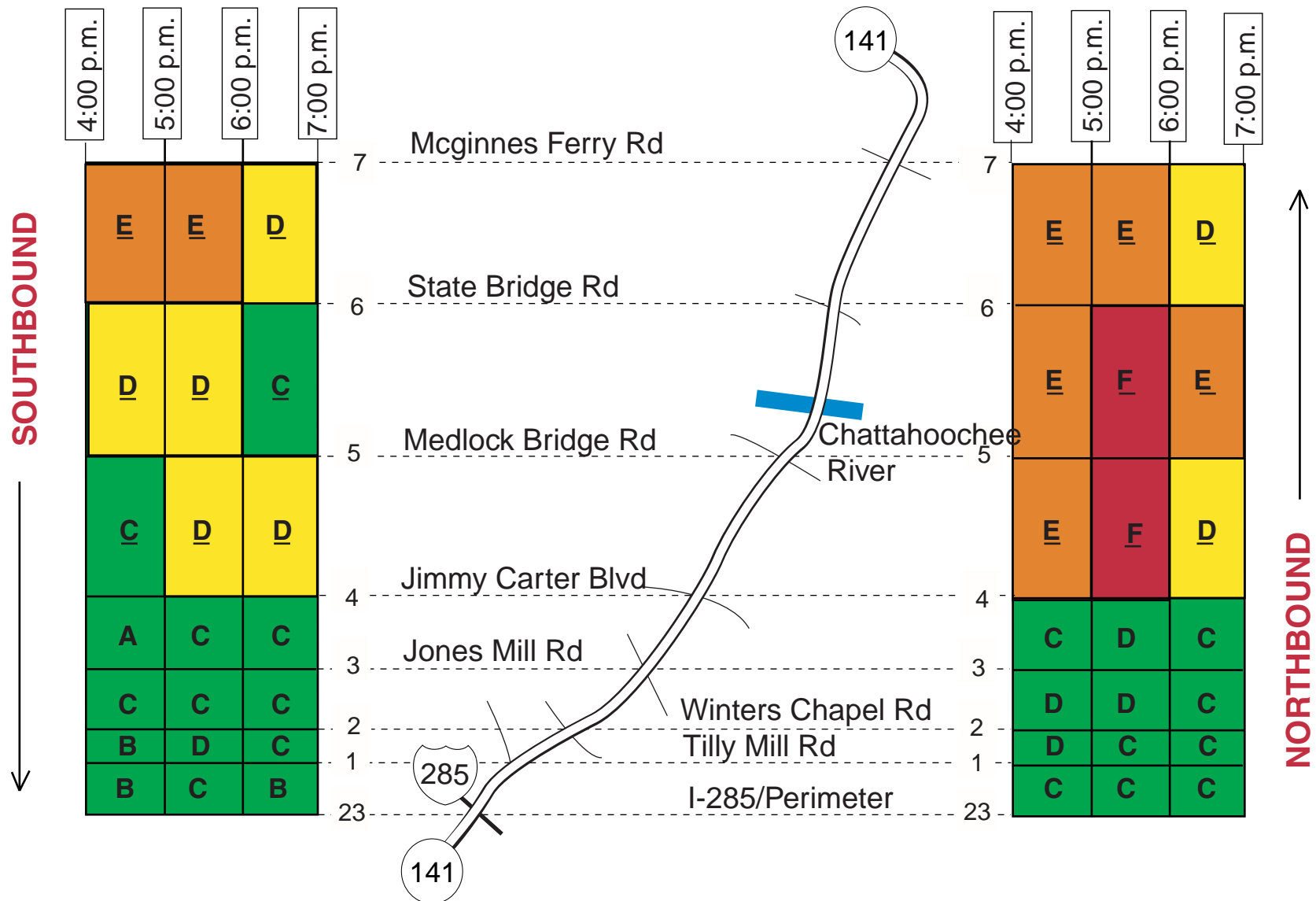
MORNING (FALL 1998)



PEACHTREE IND. BLVD PKWY / MEDLOCK BRIDGE RD (SR 141)

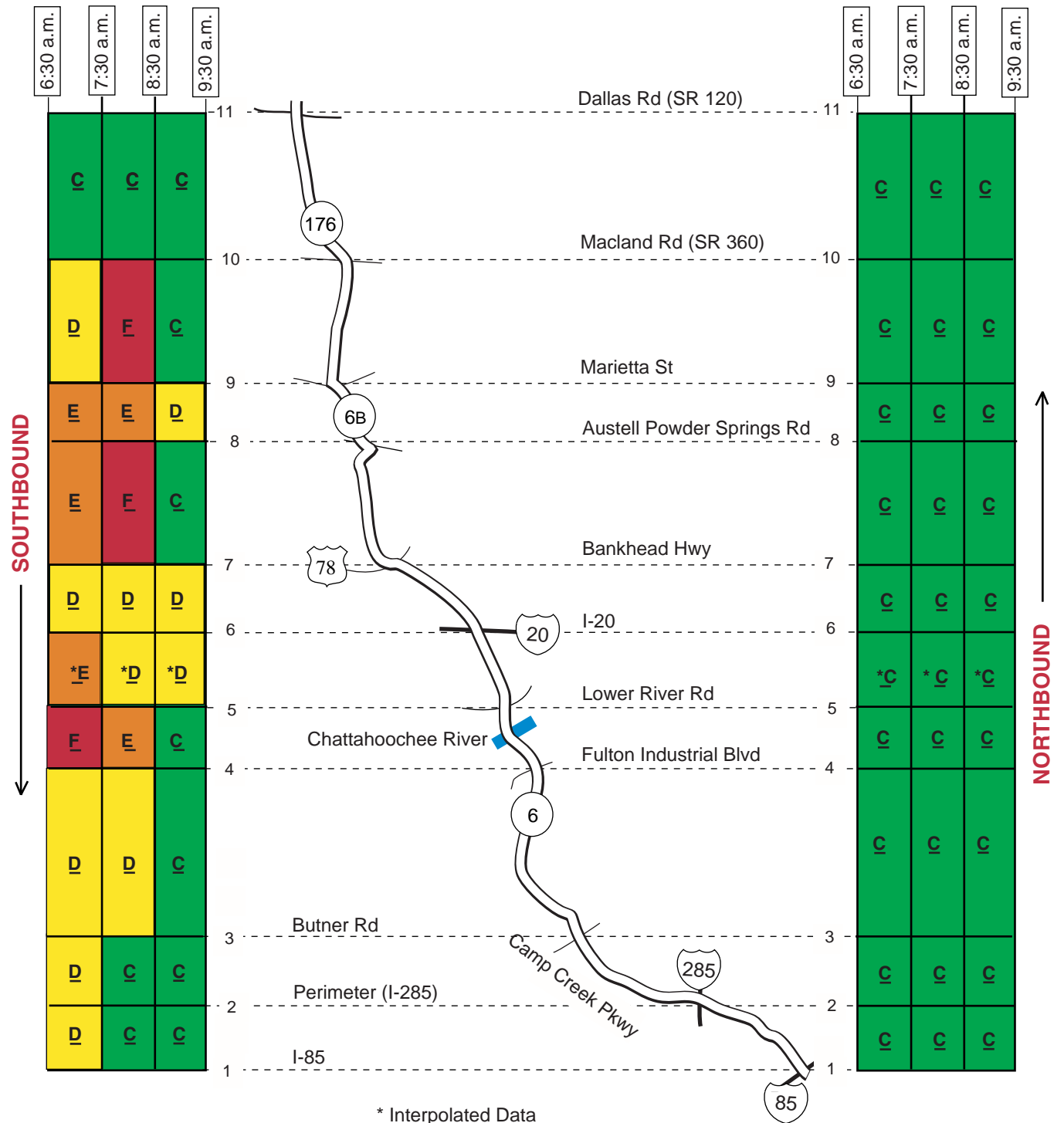
(Fulton / Gwinnett / Dekalb Co.)

EVENING (FALL 1998)

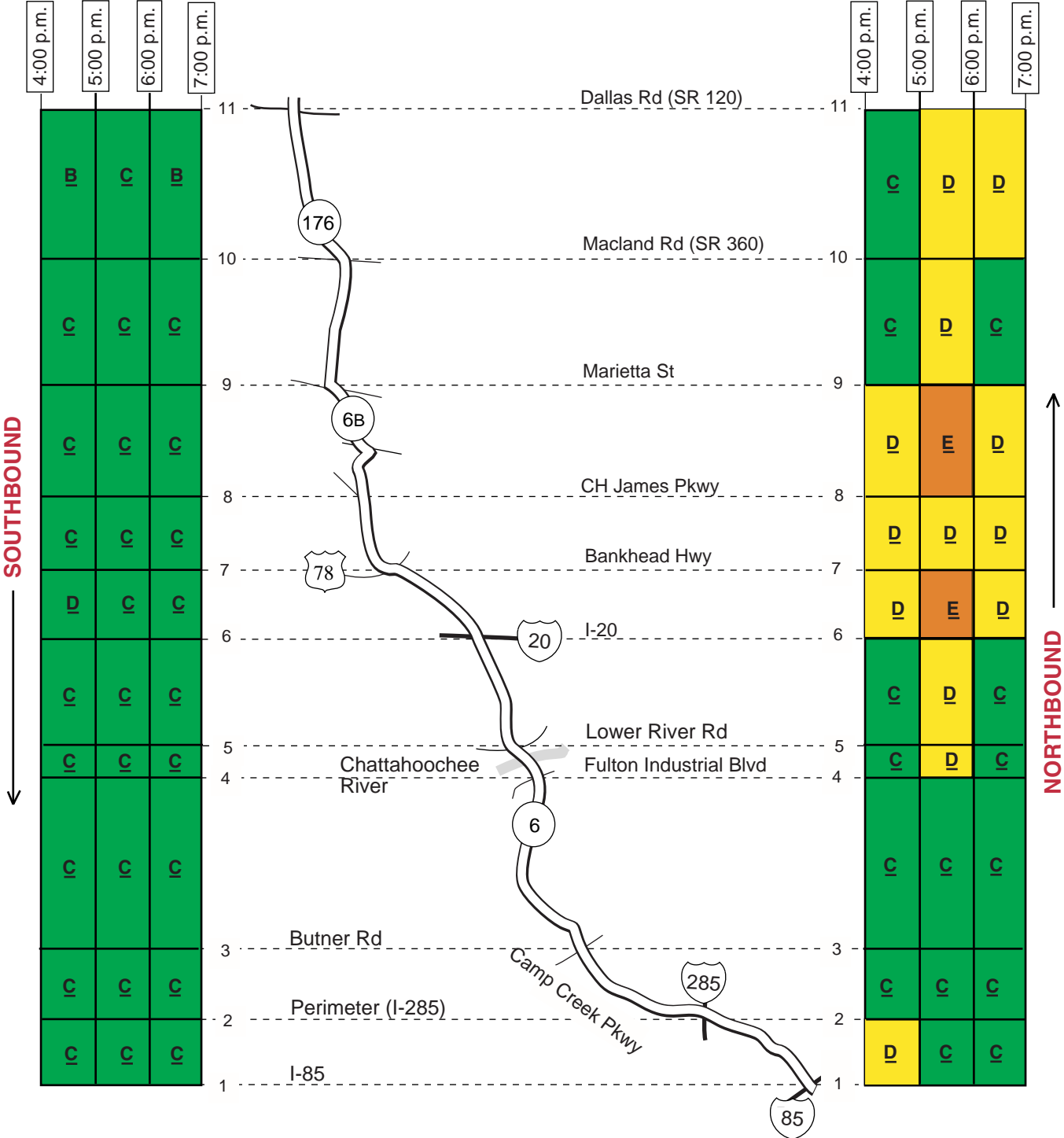


**SR 176 / SR 6 / CAMP CREEK PKWY
(Cobb / Douglas / Fulton Co.)**

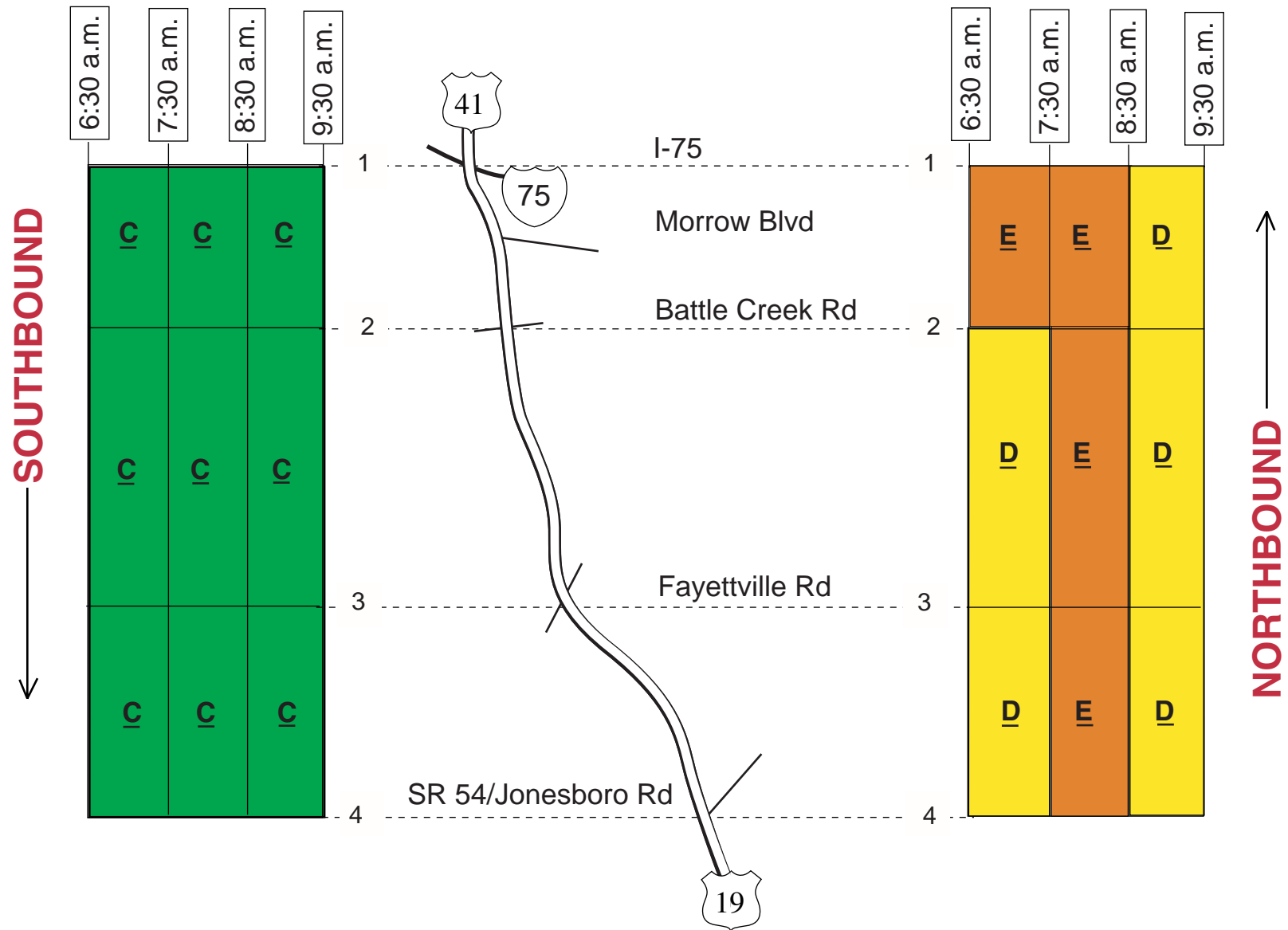
MORNING (FALL 1998)



SR 176 / SR 6 / CAMP CREEK PKWY
(Cobb / Douglas / Fulton Co.)
EVENING (FALL 1998)

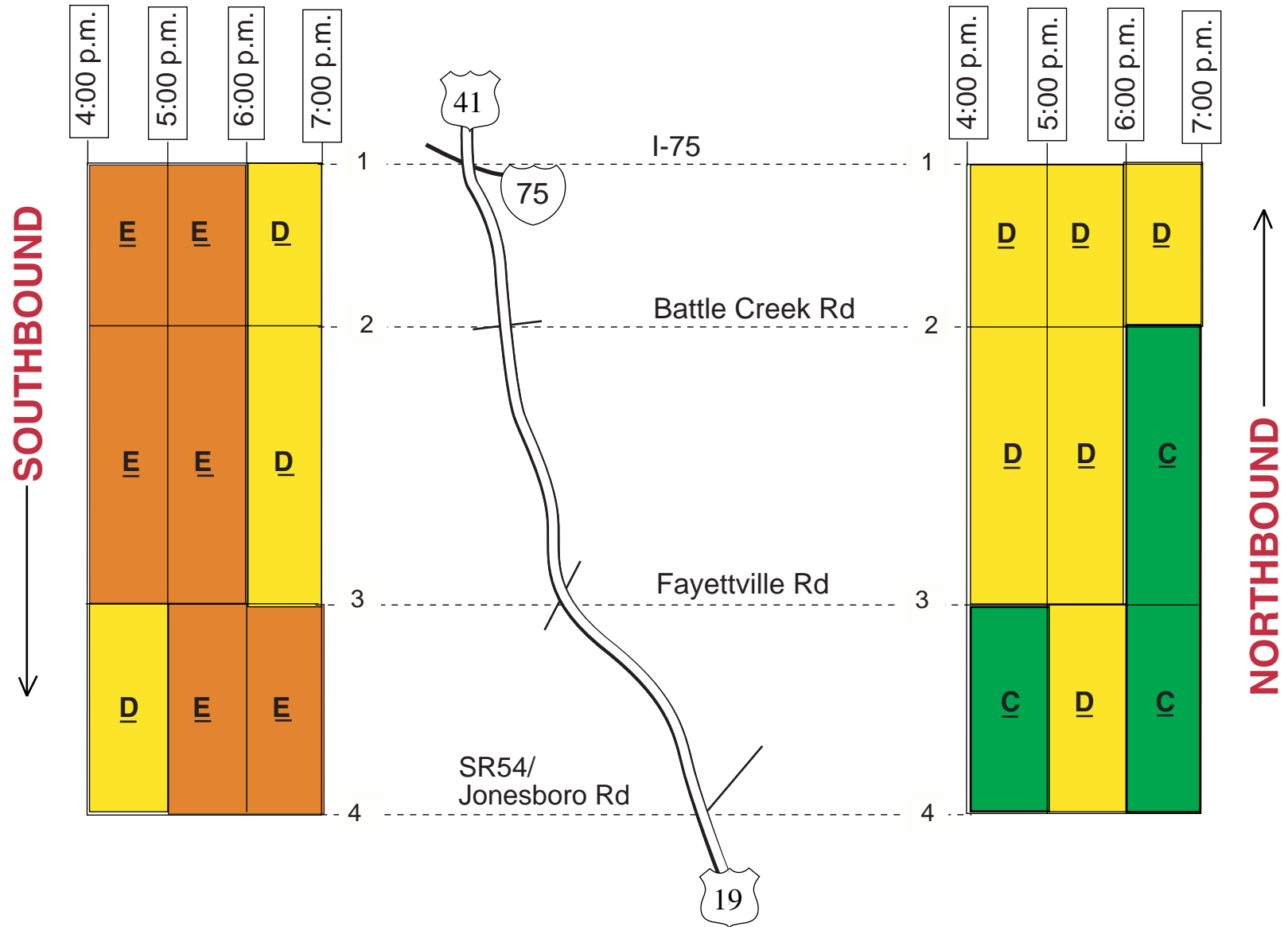


**US 41 / 19 (TARA BLVD)
(Clayton County)
MORNING (FALL 1998)**



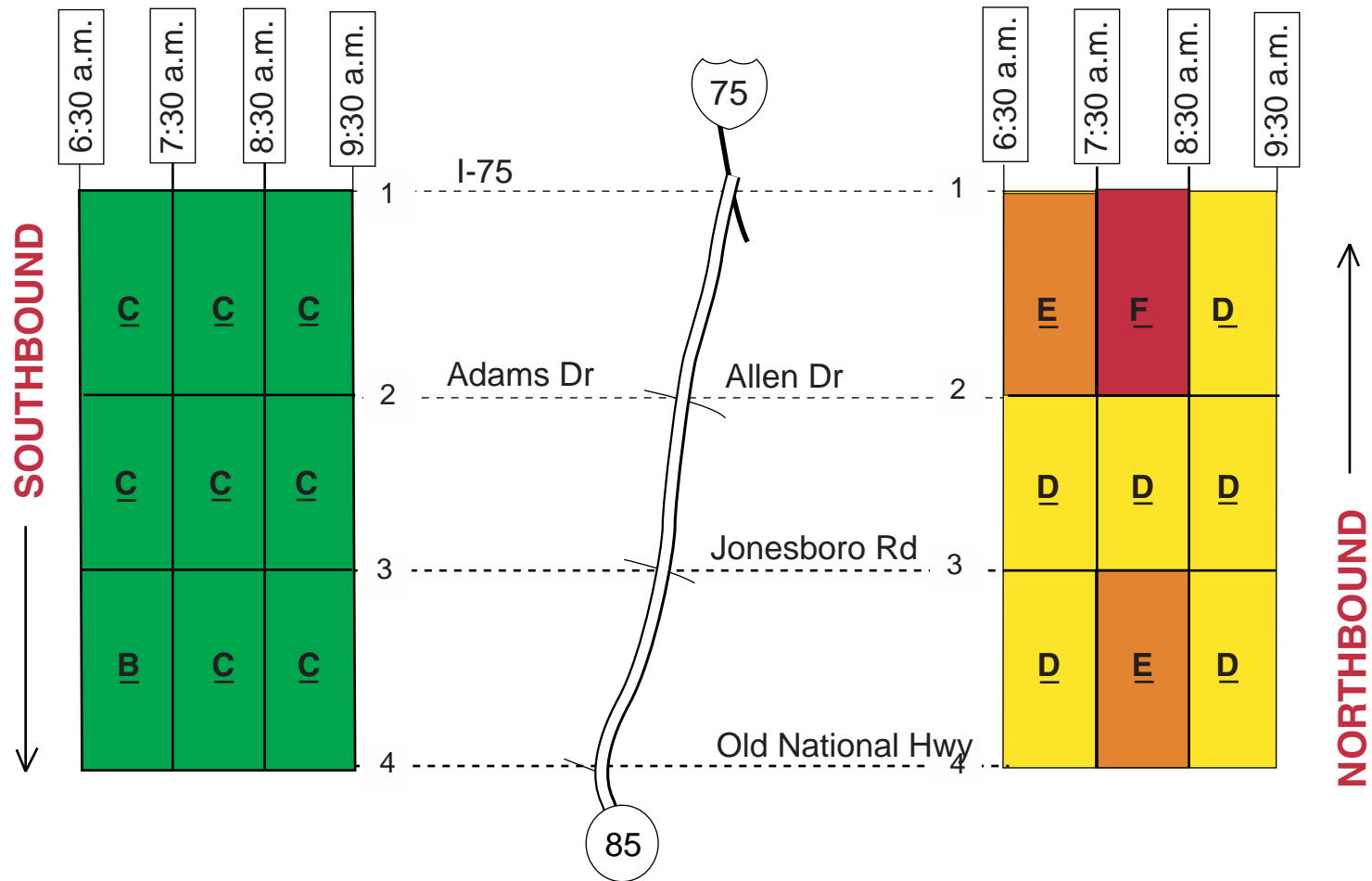
**US 41 / 19 (TARA BLVD)
(Clayton County)**

EVENING (FALL 1998)



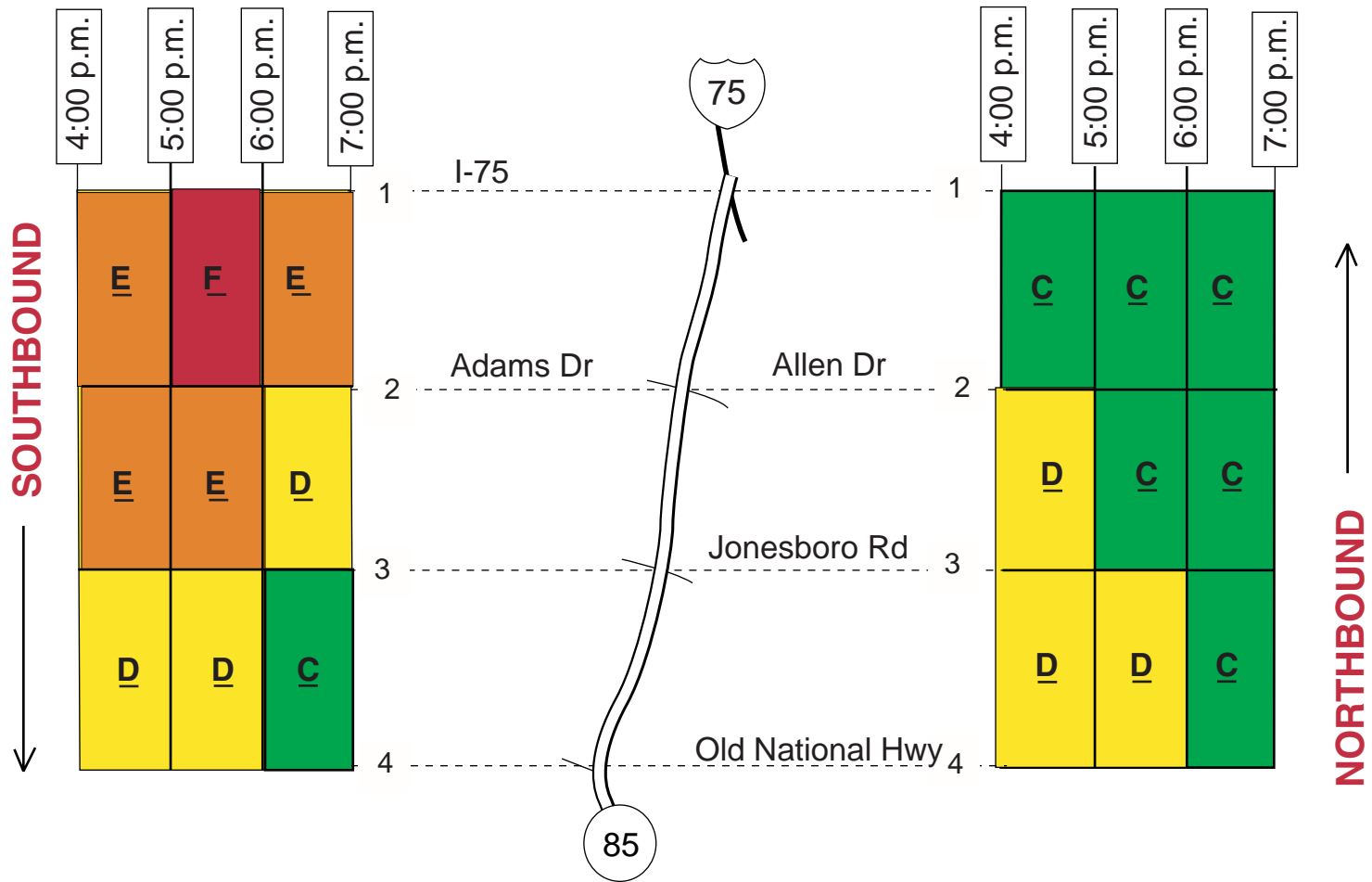
**SR 85
(Clayton County)**

MORNING (FALL 1998)



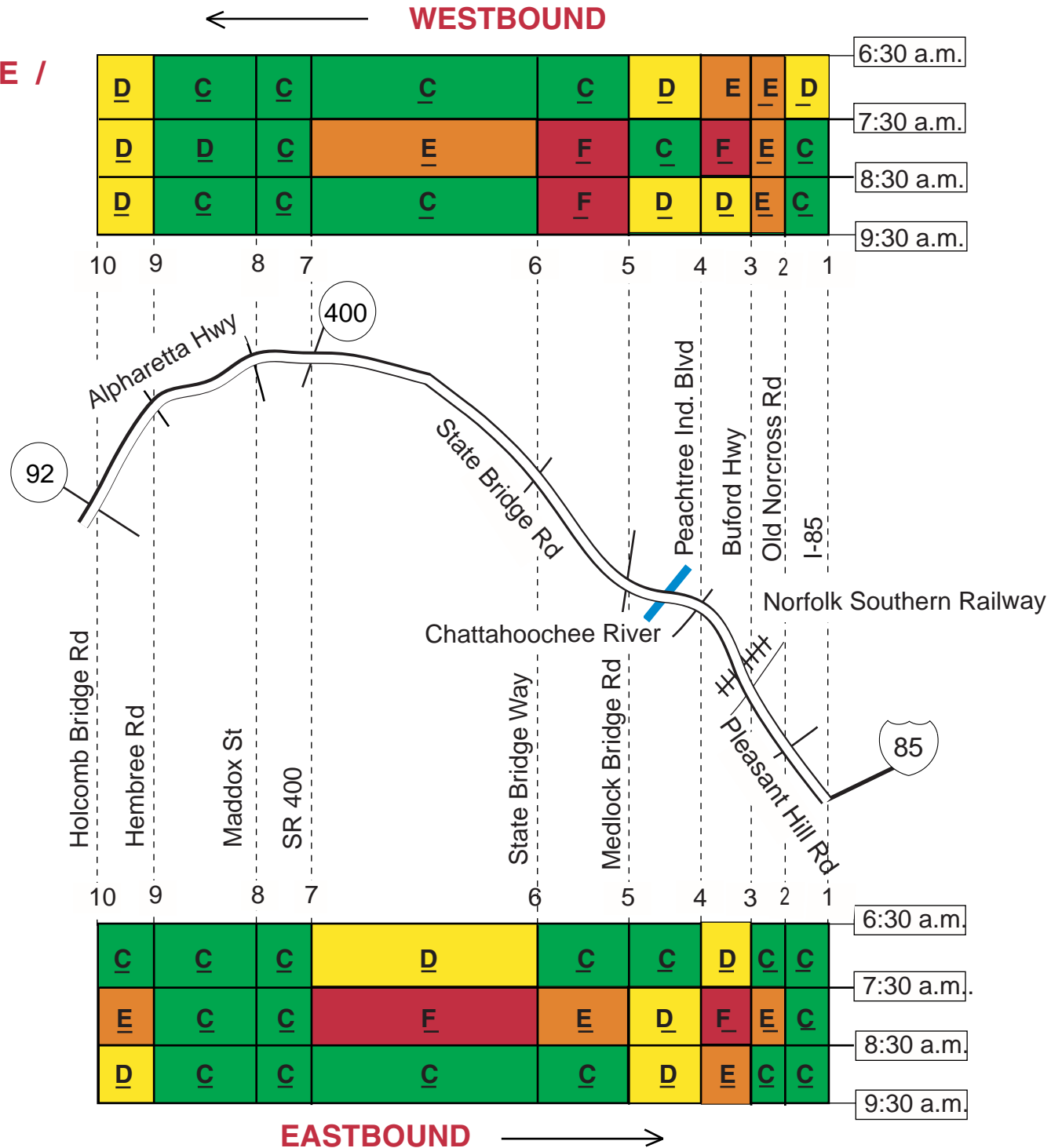
**SR 85
(Clayton County)**

EVENING (FALL 1998)

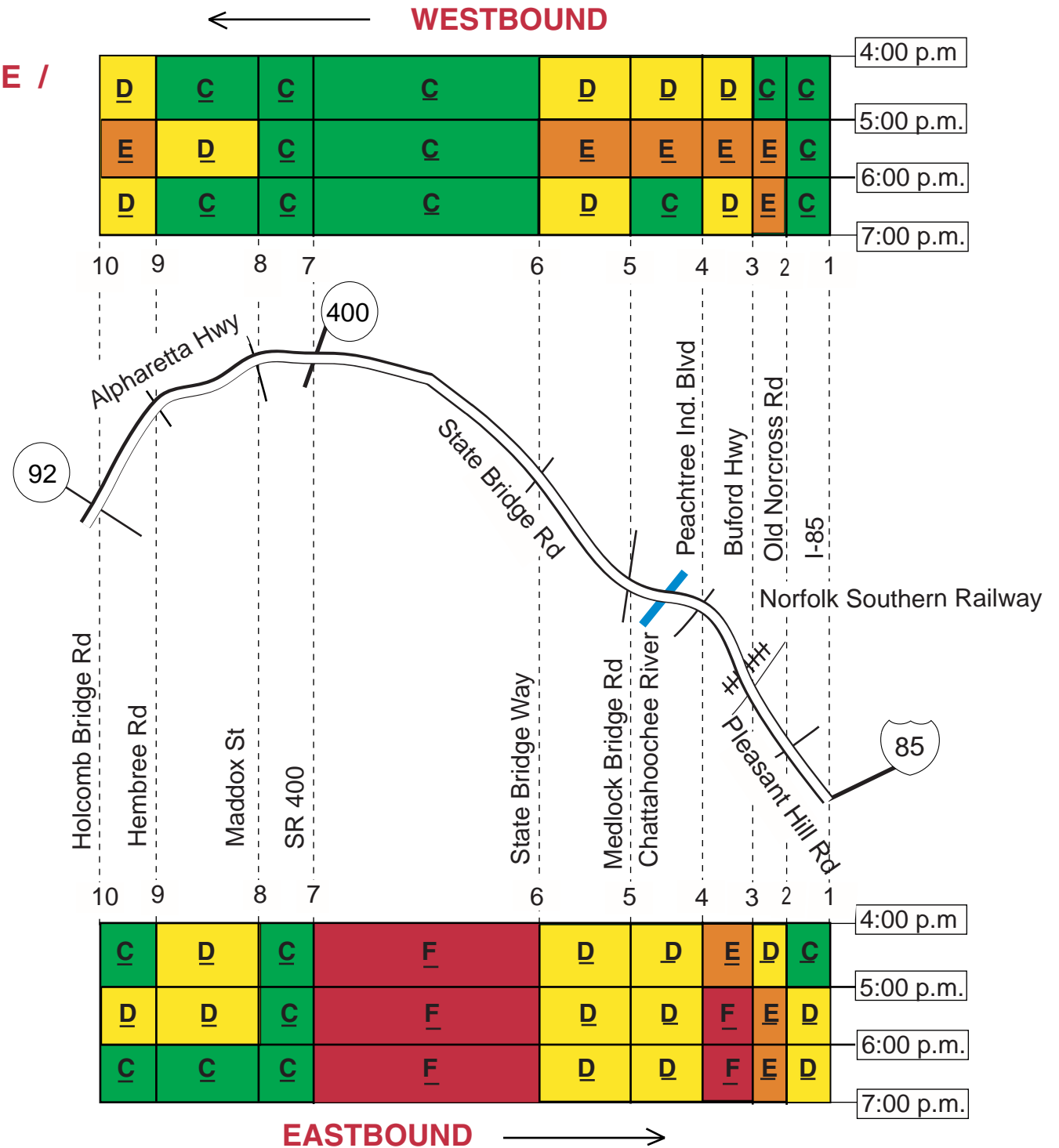


ALPHARETTA / STATE BRIDGE / PL. HILL RD (SR 120)

(Fulton / Gwinnett Co.)
MORNING (FALL 1998)

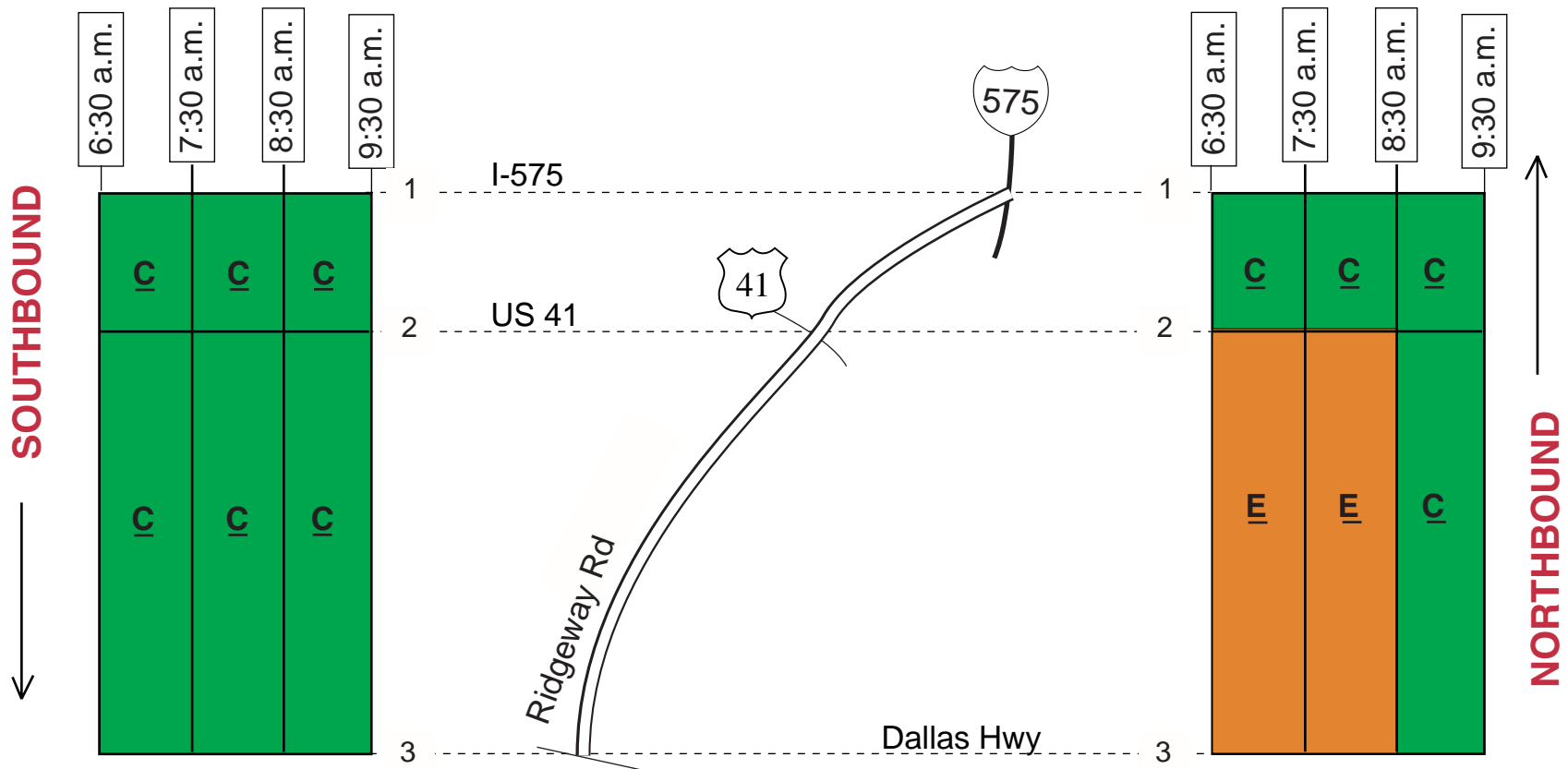


**(Fulton / Gwinnett Co.)
EVENING (FALL 1998)**



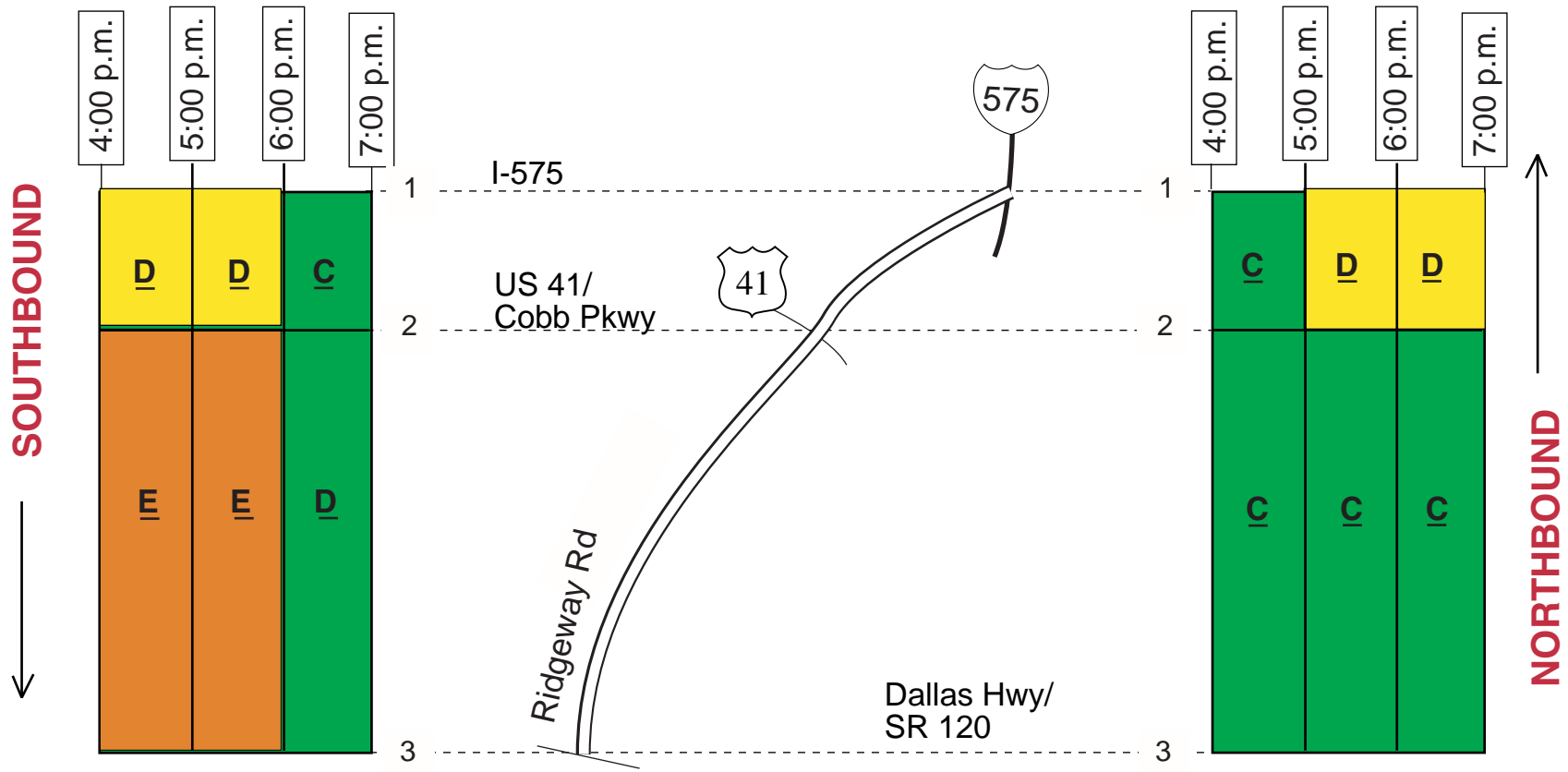
RIDGEWAY RD / BARRETT PKWY (Cobb County)

MORNING (FALL 1998)

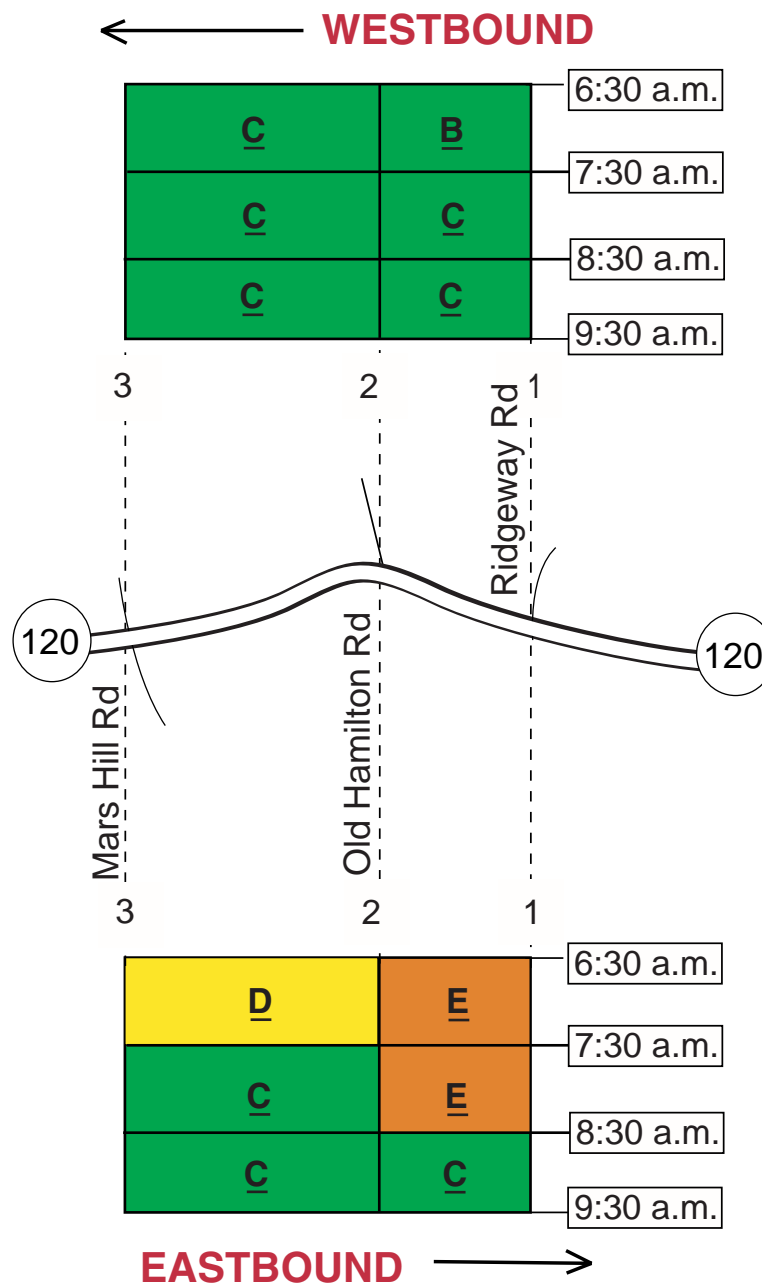


RIDGEWAY RD / BARRETT PKWY (Cobb County)

EVENING (FALL 1998)

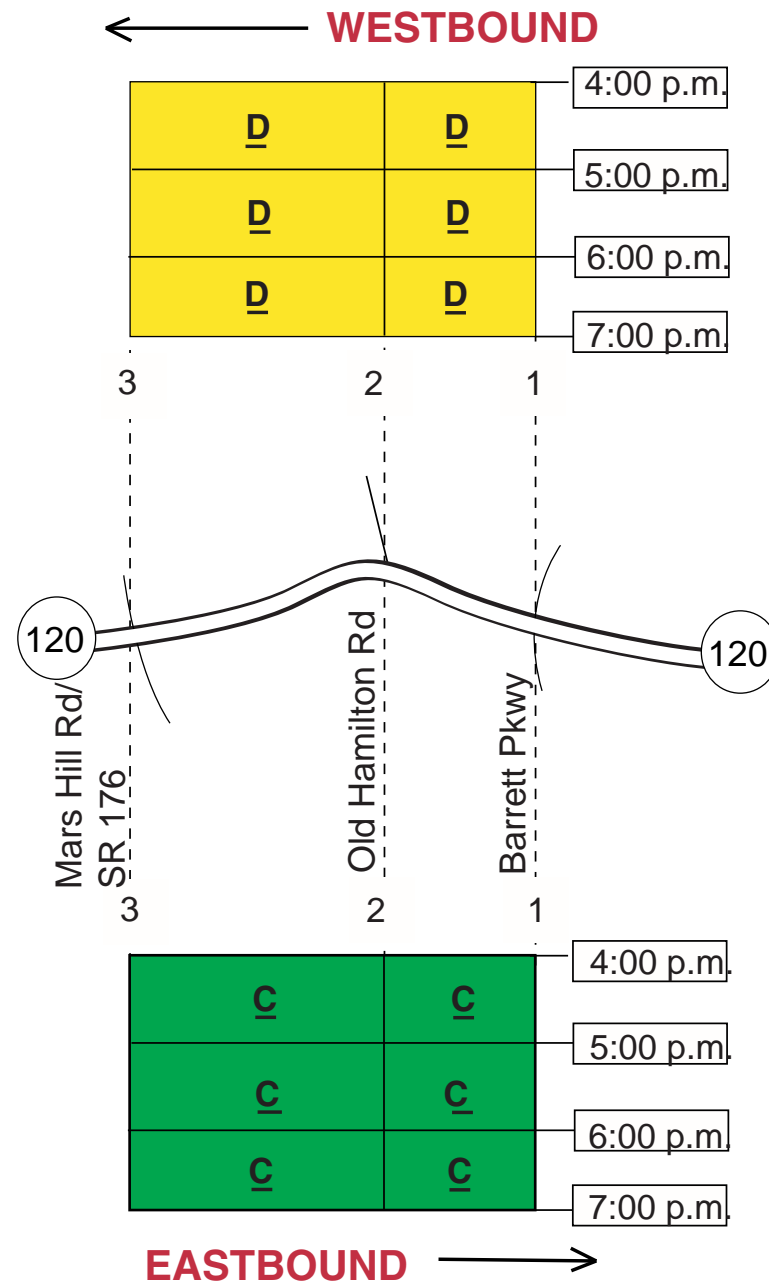


DALLAS RD (SR 120)
(Cobb County)
MORNING (FALL 1999)



DALLAS RD (SR 120)
(Cobb County)

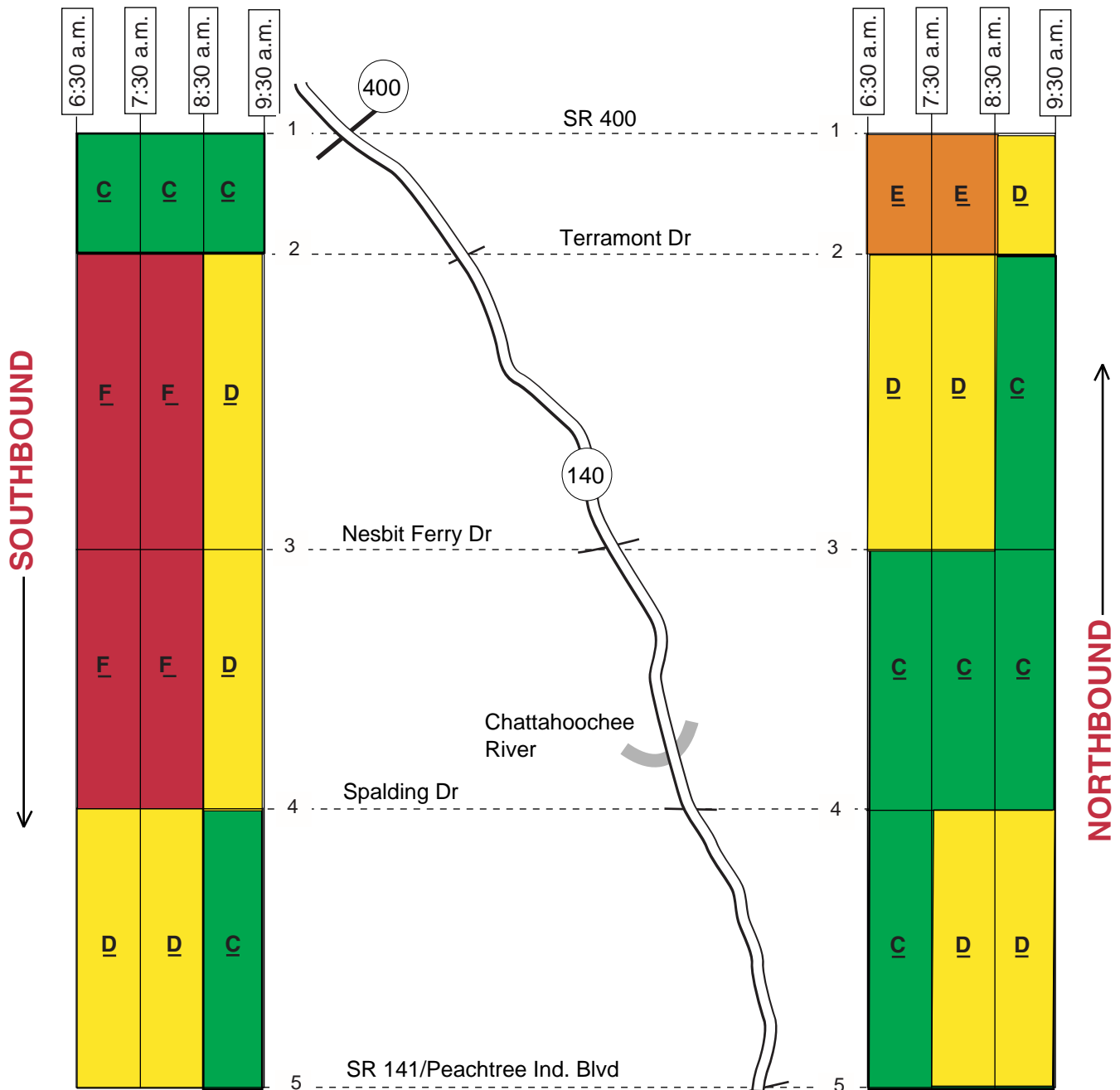
EVENING (FALL 1998)



HOLCOMB BRIDGE RD (SR 140)

(Gwinnett / Fulton Co.)

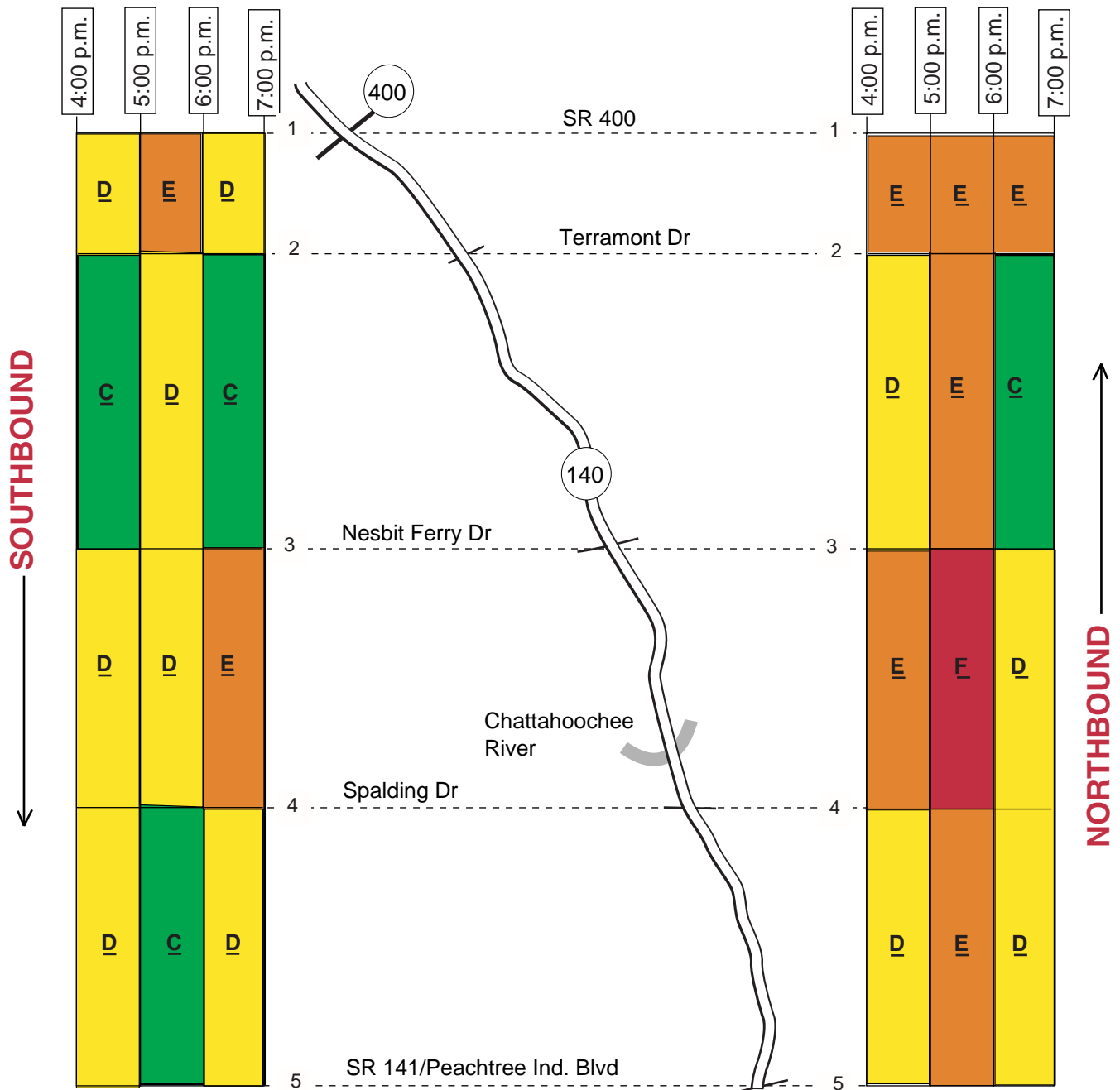
MORNING (FALL 1998)



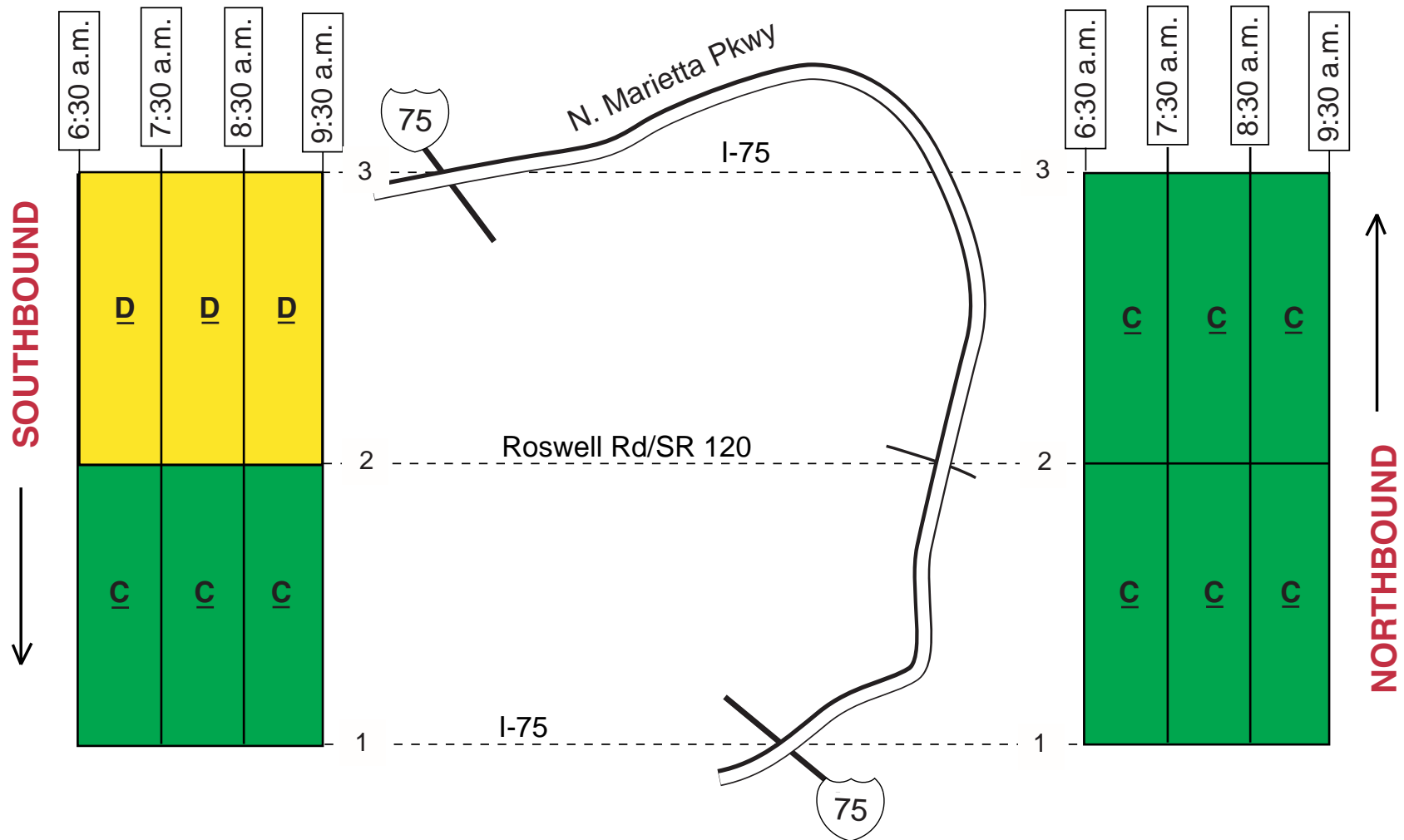
HOLCOMB BRIDGE RD (SR 140)

(Gwinnett / Fulton Co.)

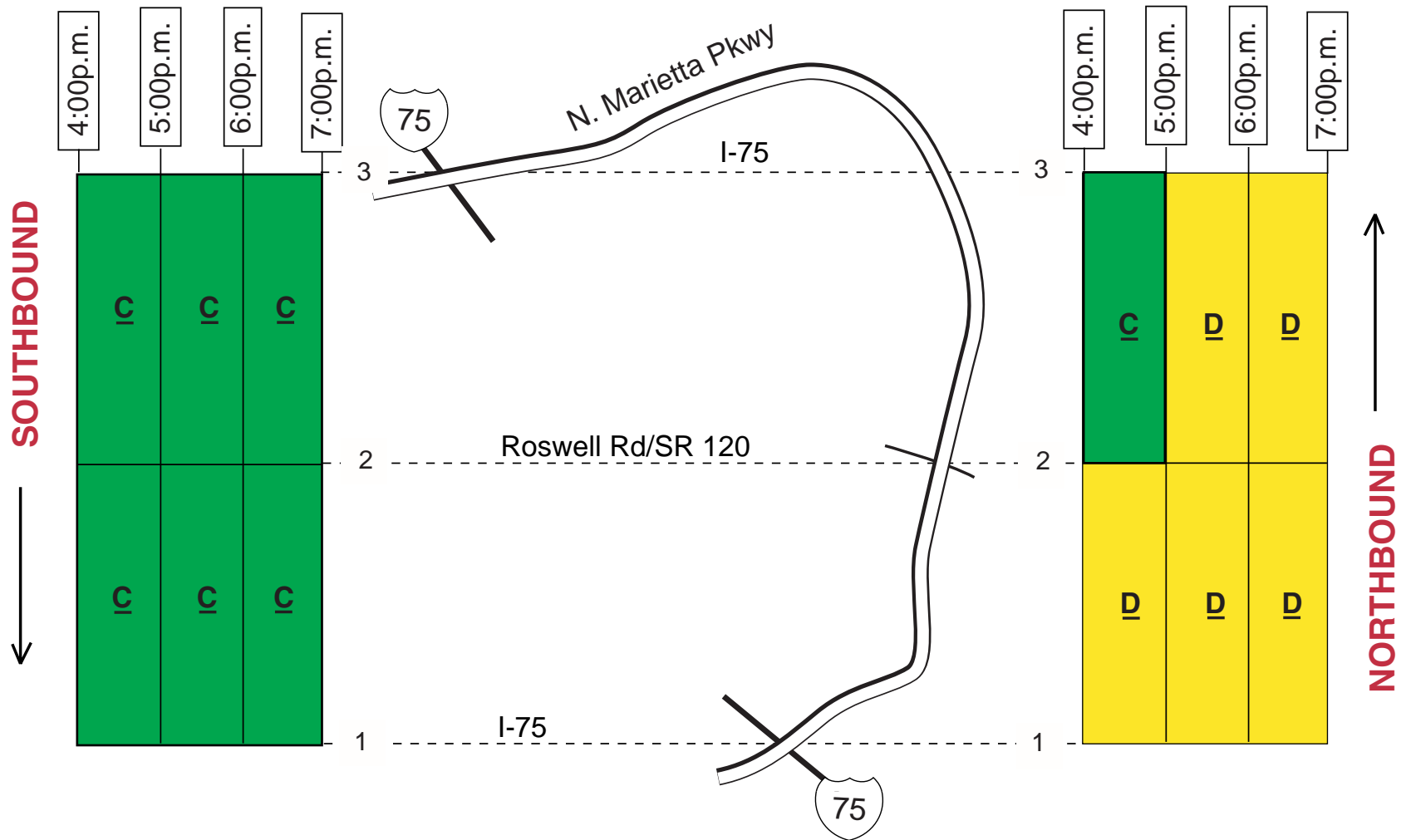
EVENING (FALL 1998)



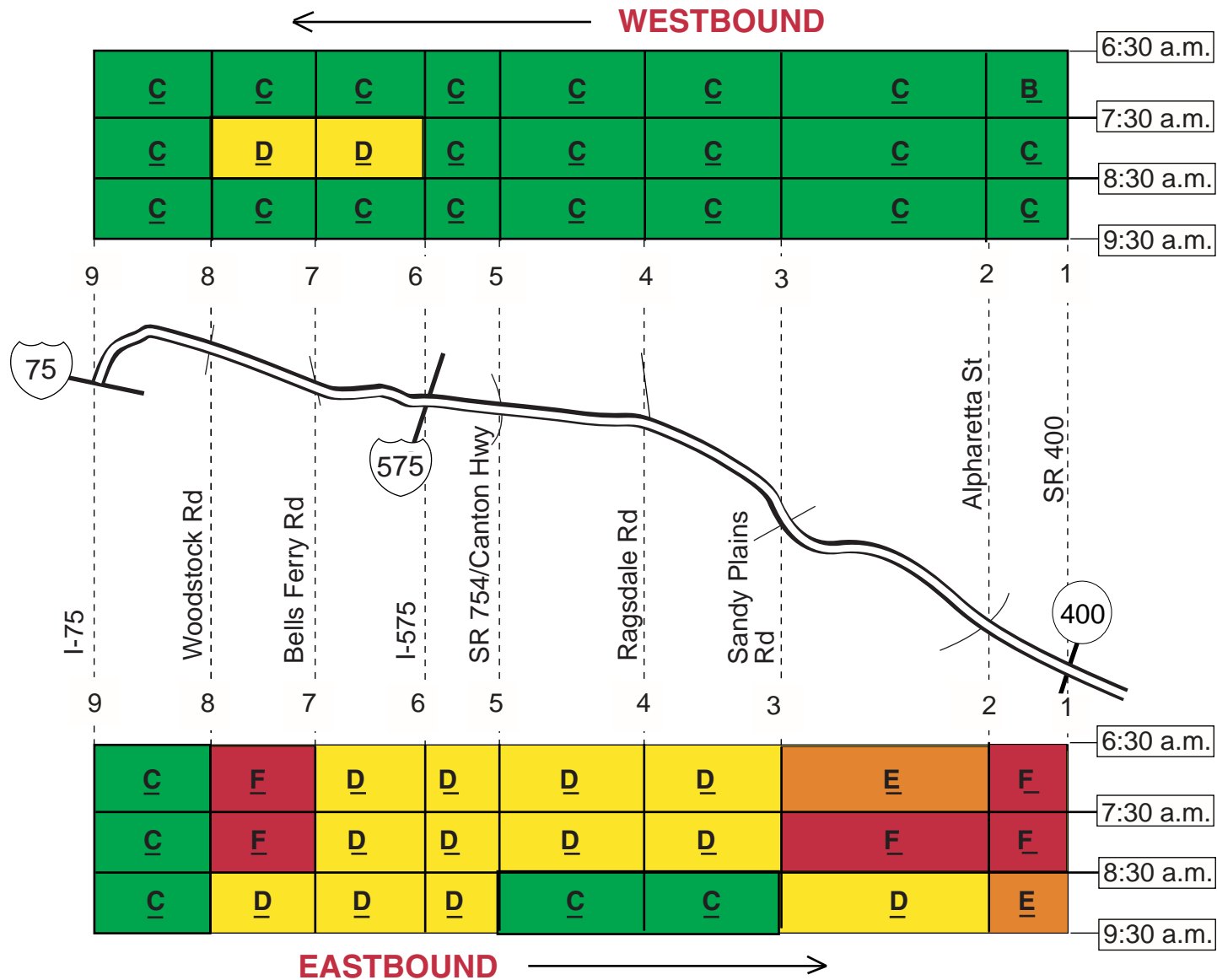
**MARIETTA PKWY
(Cobb County)**
MORNING (FALL 1998)



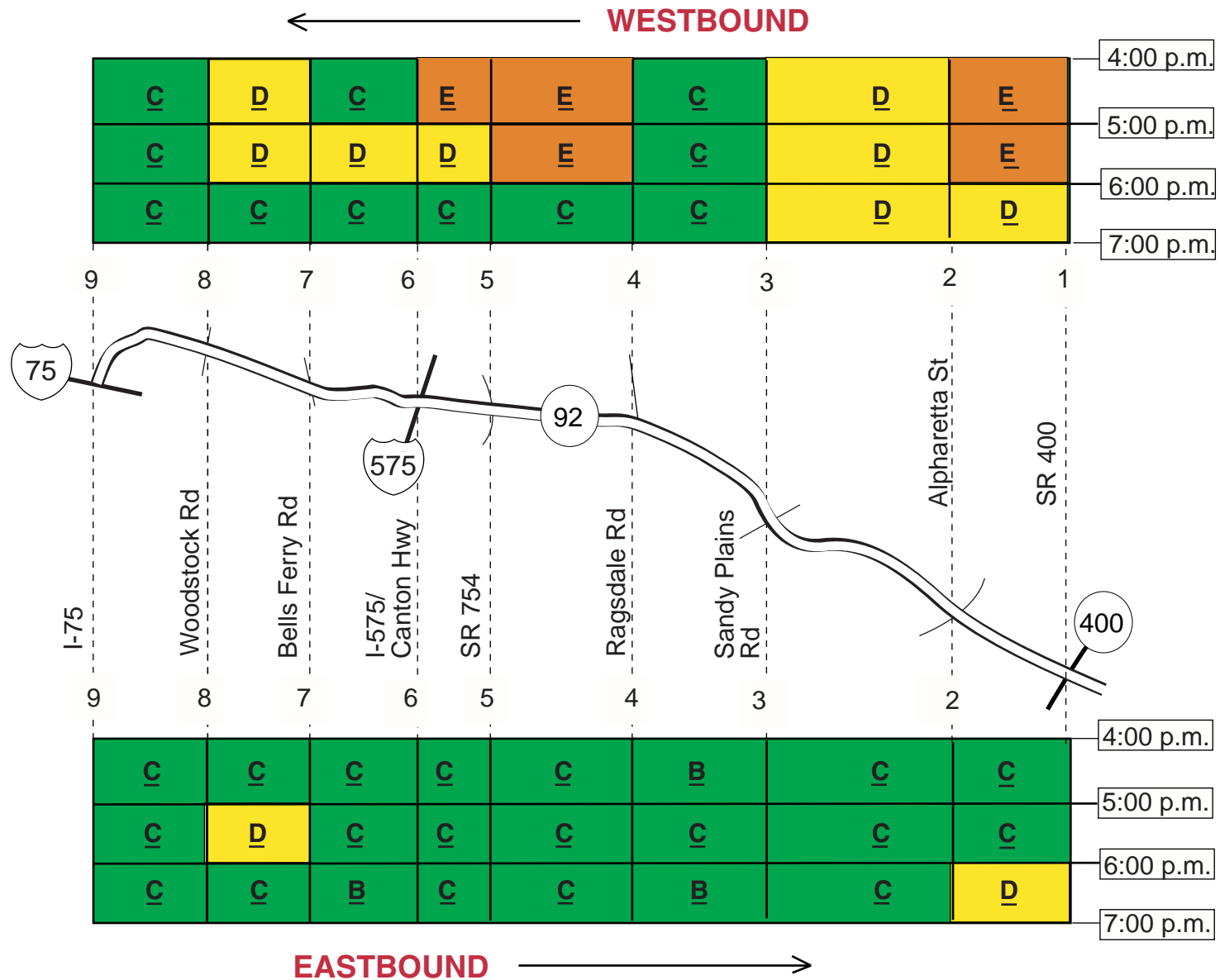
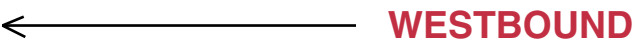
**MARIETTA PKWY
(Cobb County)
EVENING (FALL 1998)**



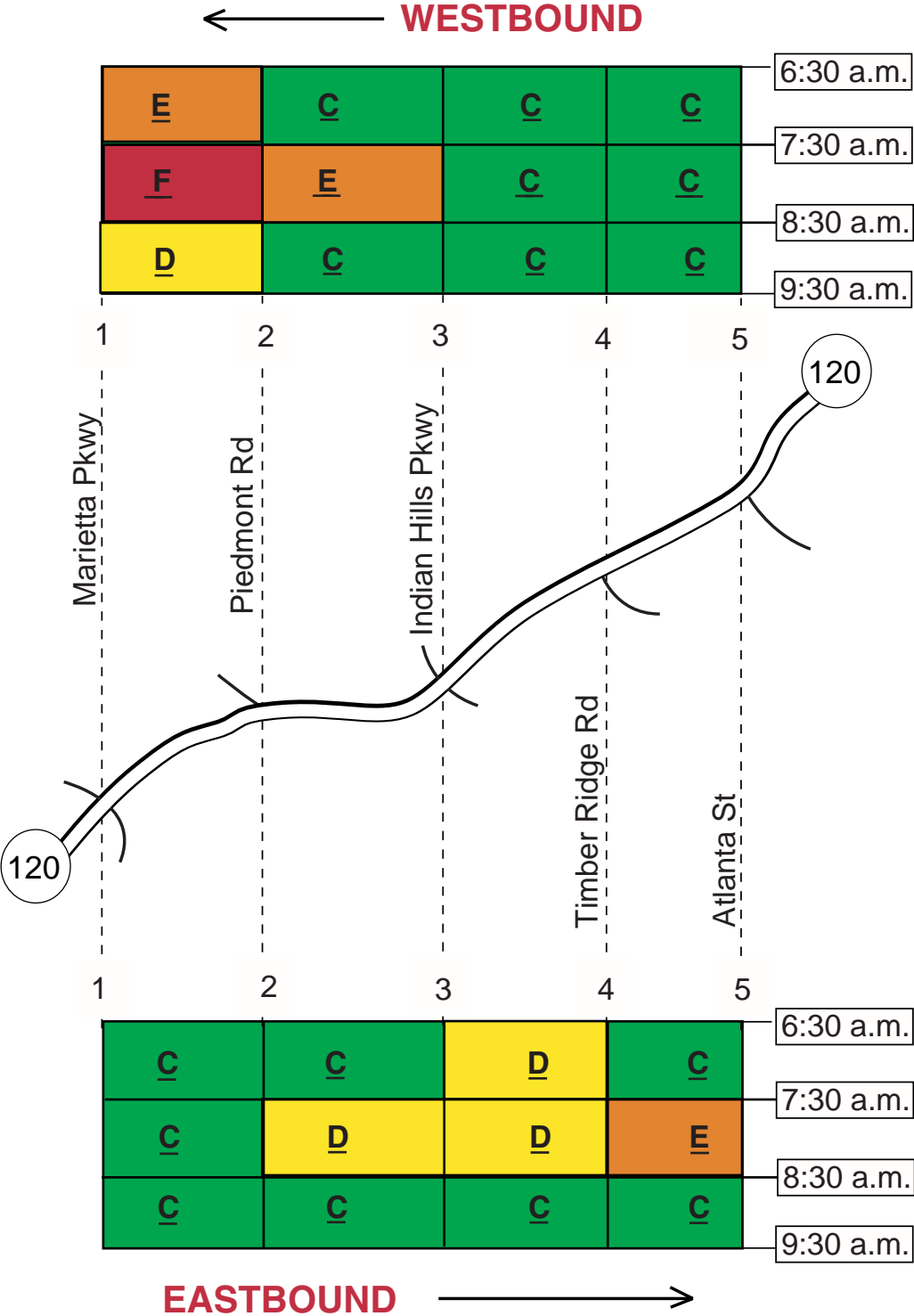
SR 92 (CROSSVILLE / WOODSTOCK /ALABAMA RD)
(Cherokee / Fulton Co.)
MORNING (FALL 1998)



**(Cherokee / Fulton Co.)
EVENING (FALL 1998)**



ROSWELL RD (SR 120)
(Cobb County)
MORNING (FALL 1998)



ROSWELL RD (SR 120) (Cobb County)

EVENING (FALL 1998)

